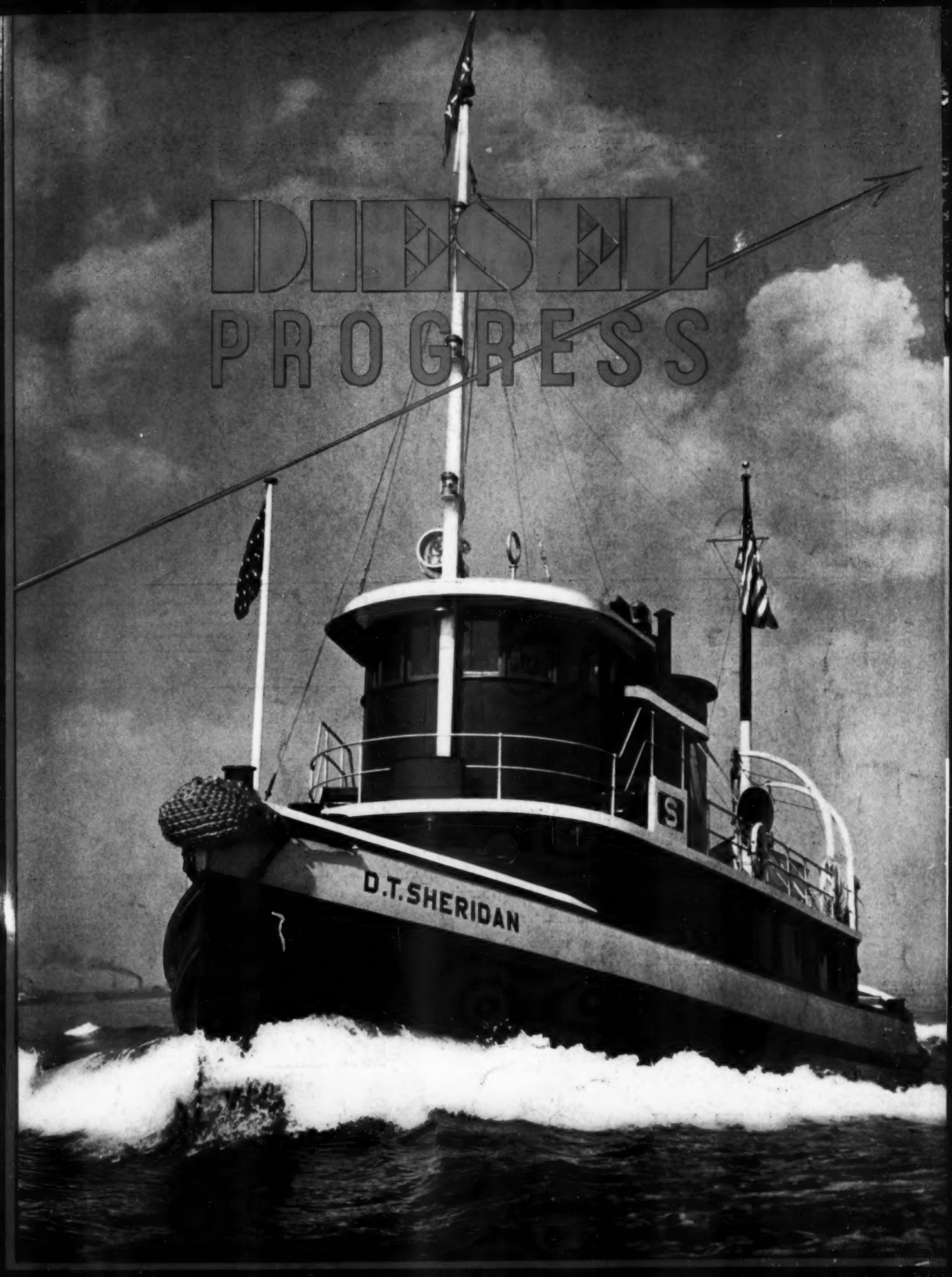

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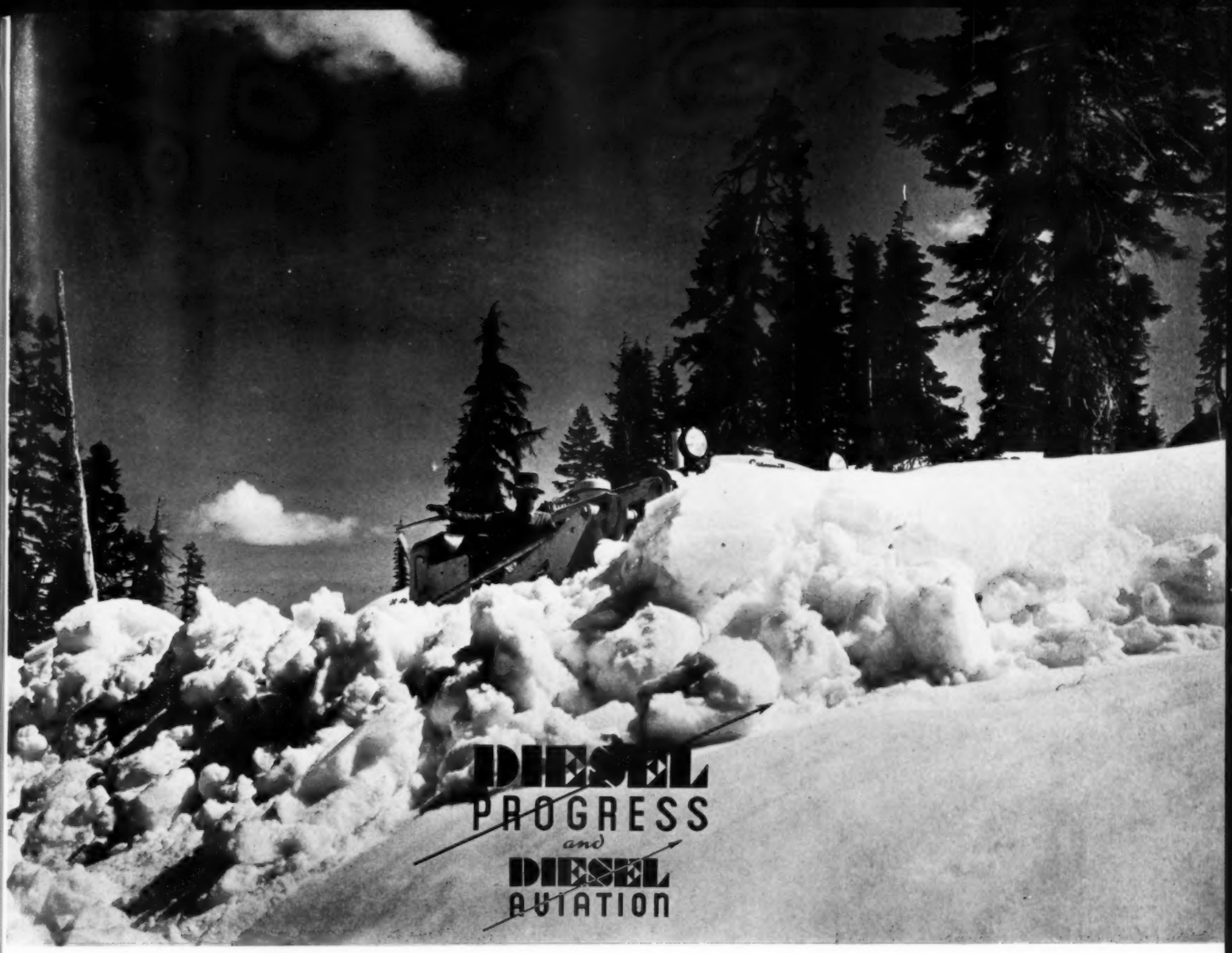

REX W. WADMAN
Editor and Publisher

FRONT COVER ILLUSTRATION: The Diesel tug, *D. T. Sheridan,* largest of the year. (See detailed description on pages 18 and 19.)

TABLE OF CONTENTS ILLUSTRATION: Diesel-powered tractors are used throughout the length and breadth of the land to keep our roads open during the winter. Here is a Caterpillar D-7 Diesel tractor with a 10 ft. trailbuilder clearing snow on twenty-five miles of the Lassen Peak Highway near Mineral, California.

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HEYWORTH CAMPBELL
Art Director

PAUL H. WILKINSON
Aviation Editor

CCA

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NOVEMBER. 1939

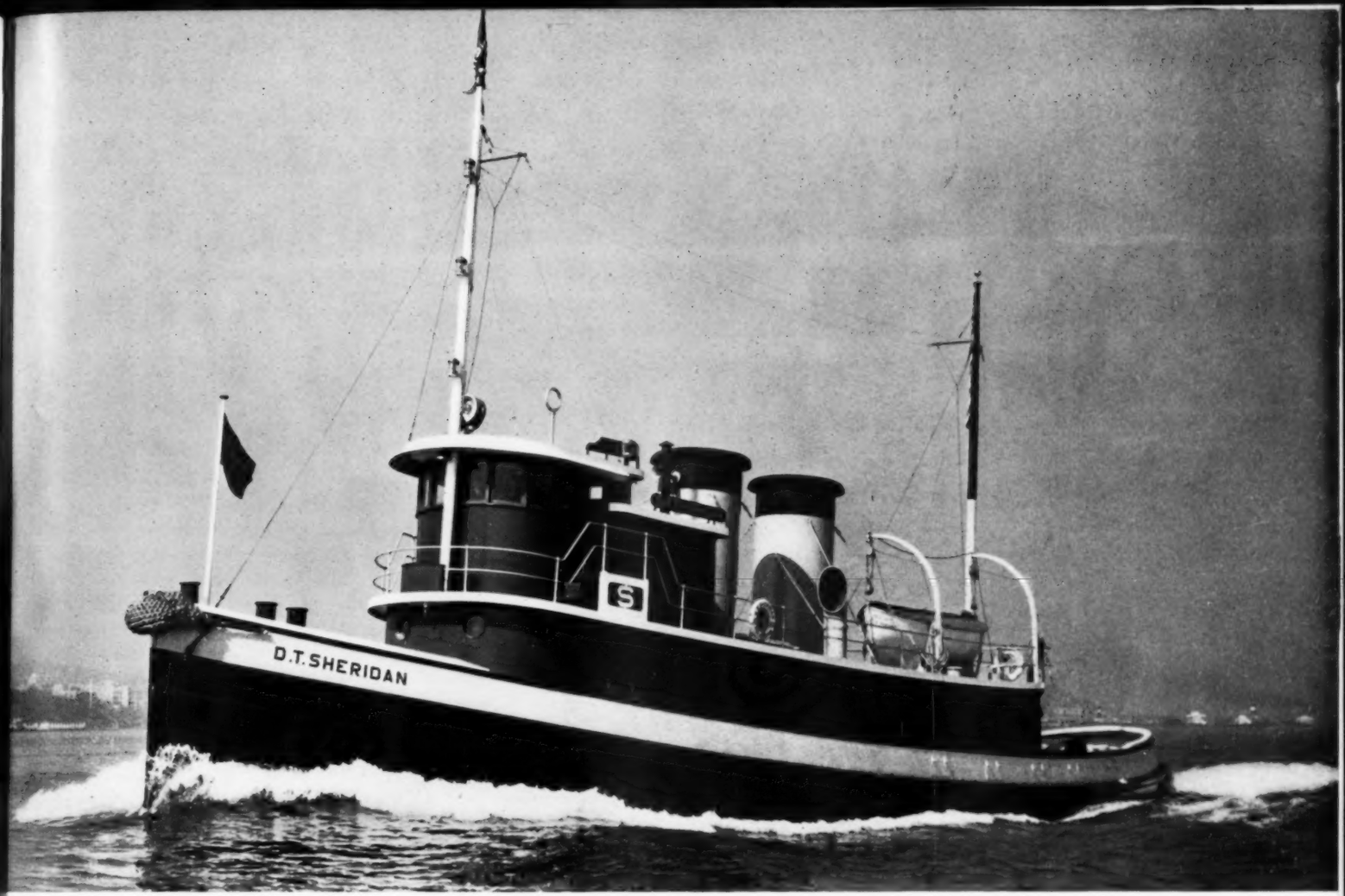
The main engine room of the "D. T. Sheridan" showing auxiliary engines with acoustic housing.

Engine room control station showing Weston tachometer and Brown pyrometer.

DIESEL TUG—"D. T. SHERIDAN"

By GEORGE D. CROSSLEY

THE largest Diesel tug of the year is but a mild description of the *D. T. Sheridan* which was launched on July 5 and placed in commission October 9. Designed and built by Ira S. Bushey & Sons, Brooklyn, New York, for the Sheridan Towing Company, Inc., of Philadelphia, this new seagoing towboat is a real contribution to the art. The principal dimensions are 116 ft. long with 26 ft. beam and 13 ft. depth. The hull is all-welded steel and the main power plant consists of a Fairbanks-Morse 6 cylinder, 1,000 hp., 275 rpm., Model 37-D-16, 2 cycle, airless injection, direct drive, direct reversible propulsion Diesel engine fitted with oil-cooled pistons, open head combustion, differential injection valves, back flow scavenging, and twin Nugent fuel oil strainers. An Electro Dynamic 40 kw., 125 v., direct current generator is driven off the main engine flywheel through a "V" belt drive, as is indicated in one of the illustrations.



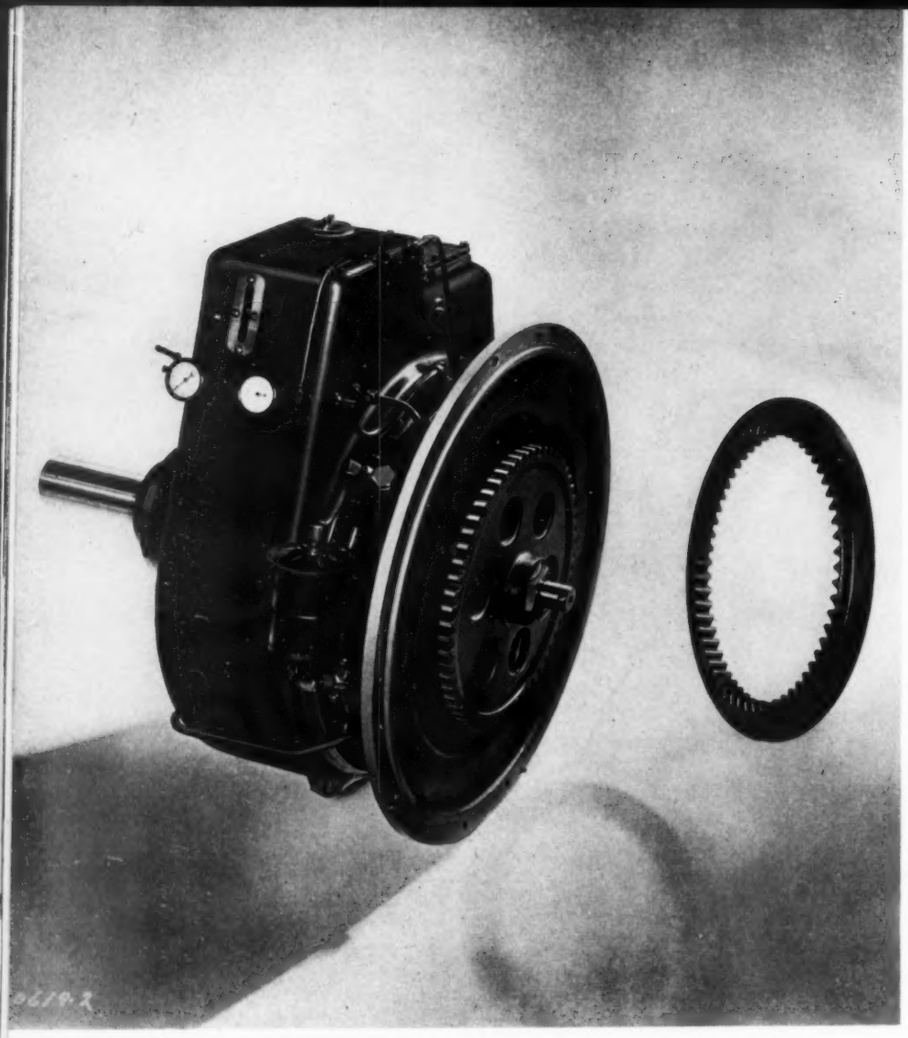
One of the outstanding developments in tugboat equipment was originated by the Ira S. Bushey & Sons in the towboat *Chaplain* which was described on pages 25, 26, and 27 of our June, 1939, issue. We refer to the lining of the entire engine compartment with acoustical material. This was the first boat of its type to receive complete engine room sound-proofing which, combined with insulation of the entire superstructure, was calculated to greatly enhance the comfort of the crew. In the *D. T. Sheridan*, this idea has been carried further. Johns-Manville acoustical veneer, backed with their super felt on walls and ceiling, is carried through the engine room, captain's cabin, crew's quarters, and pilot house, thereby making the boat quieter and more pleasant in which to live.

Another forward-looking development on the *D. T. Sheridan* is the placing of Korfund steel spring Vibro-Isolators under each of the two 6-cylinder Fairbanks-Morse auxiliary Diesel generating sets. Furthermore, both of these auxiliary engines and generators are completely housed within a Burgess acoustic hood. The net result of this is that these two auxiliary units can scarcely be heard either in the engine room or anywhere on the vessel.

The following independent auxiliaries are all motor driven: One 5 hp., 125 v. D.C. Fairbanks-Morse motor-driven, salt water centrifugal pump combination. One 10 hp. 125 v. D.C. Fairbanks-Morse motor-driven, fresh water circulating centrifugal pump combination. One 10 hp. Fairbanks-Morse 125 v. D.C. motor-driven rotary combination for pumping lubricating oil to the engine and pistons. One 10 hp. Fairbanks-Morse 125 v. D.C. motor, double end driven, a before and after cooling combination, comprising an F-M fresh water pump and rotary lube oil pump. Two Fairbanks-Morse ¼ hp. 125 v. D.C. fuel oil transfer rotary pumps. Two 15 hp. 125 v. D.C. marine type F-M motor "V" belt connected to Gardner Denver air compressors. One 12 gal. Youngstown-Miller oil purifier. One Schutte Koerting heat exchanger and one Schutte Koerting oil cooler.

In addition to the above, the following ship-operating auxiliaries are installed: Two Fairbanks-Morse 4 cycle, 6 cylinder, 60 hp. Diesel engines, direct-connected to F-M marine type 40 kw. 125 v. generators. One two-panel Smith Meeker switchboard with Weston meters, knife switches, and Westinghouse automatic circuit breakers. One 100 cell 125 v. Edison storage battery. One 1½ hp. 125 v. D.C. F-M rotary general fuel oil transfer pump. One 10 hp. Electric Dynamic 125 v. D.C. motor, direct-connected to Carter Humdinger, general service and bilge pump. One 200 gal. per hour F-M, motor-driven, fresh water pump. One 200 gal. per hour F-M motor-driven sanitary pump. Electric Hydraulic steering machinery by American Engineering Company. Maxim Silencer Company supplied the intake silencers which are located in one of the stacks to avoid drawing the exhaust gases in through the air intake and they likewise supplied the exhaust silencers for both main and auxiliary engines, which are installed in the other stack.

All in all, the *D. T. Sheridan* is a distinct credit to her designers and builders, to the engine company supplying the main and auxiliary engines, to the accessory manufacturers supplying auxiliary equipment and, most of all, to her owners, the Sheridan Towing Company.



Model F-11502 Twin Disc Torque Converter with integral water jacket.

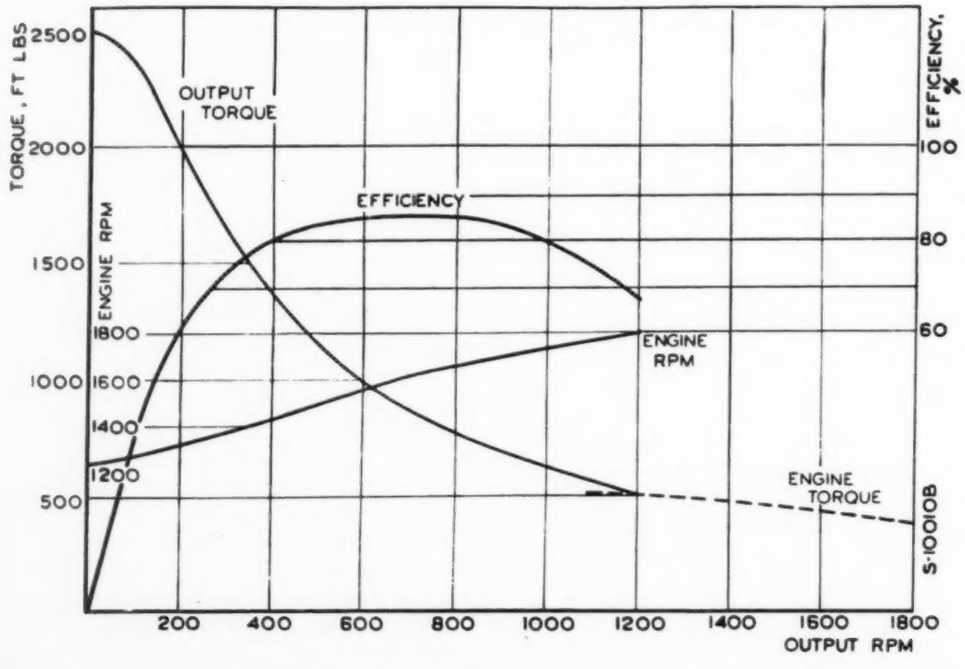
WHAT IS A TORQUE CONVERTER?

By REX W. WADMAN

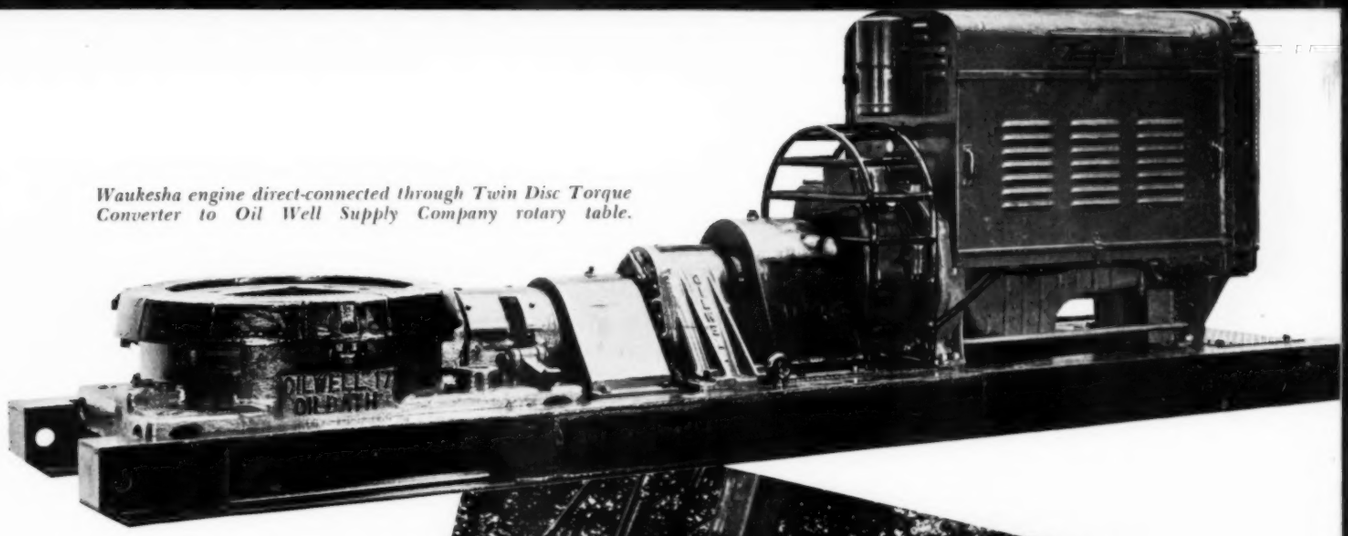
RACINE, Wisconsin, October 3, 1939—The rapid increase in use in this Diesel field of both the torque converter and the hydraulic coupling has brought a flood of correspondence across my desk, the gist of which is, "What is a Torque Converter?" When I answered that "a torque converter is a hydraulic unit which, when used in connection with an internal combustion engine, permits constant speed operation of the engine, regardless of the speed of the driven unit," I only started another flood of letters. So, I came out to Racine to get, first-hand, a few pertinent facts on the development here which I now pass on to you.

For several years the Twin Disc Clutch Company, anticipating the increasing demand for hydraulic drives for oil field, railroad, and general industrial service, has carried on the development of hydraulic units under the Lysholm-Smith patents.

I found here an experimental laboratory which has been extended to provide ample research and testing facilities. Special equipment has been installed for the development and testing of the entire operating range and characteristics of hydraulic units. The hydraulic torque converter, Series 11500, illustrated on this page, is the first in the line of hydraulic units which, in time, will be available to conform with the operating requirements of various types of service. The drooping, torque-speed characteristic (see performance diagram on this page), especially advantageous for the starting and accelerating of heavy loads, will be obtained at the output shaft of the converter in the form of high torque at low speeds, which is reduced automatically as the speed increases. Even with the output shaft of the converter completely stalled, due to extreme load conditions, the engine cannot be stalled but will continue running at its normal operating speed. Under these conditions, a maximum of approximately five times the engine torque will be available on the output shaft of the con-



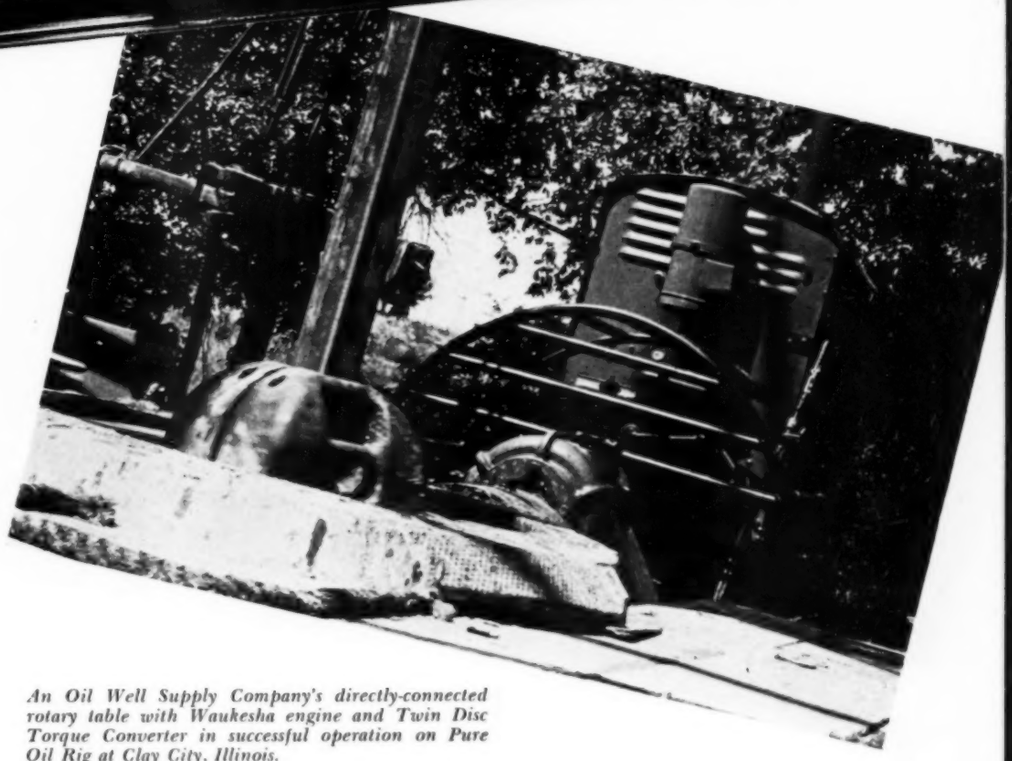
Typical Performance Curve Model F 11502 Torque Converter. Based on 500 Foot Lbs. Torque Input.



Waukesha engine direct-connected through Twin Disc Torque Converter to Oil Well Supply Company rotary table.

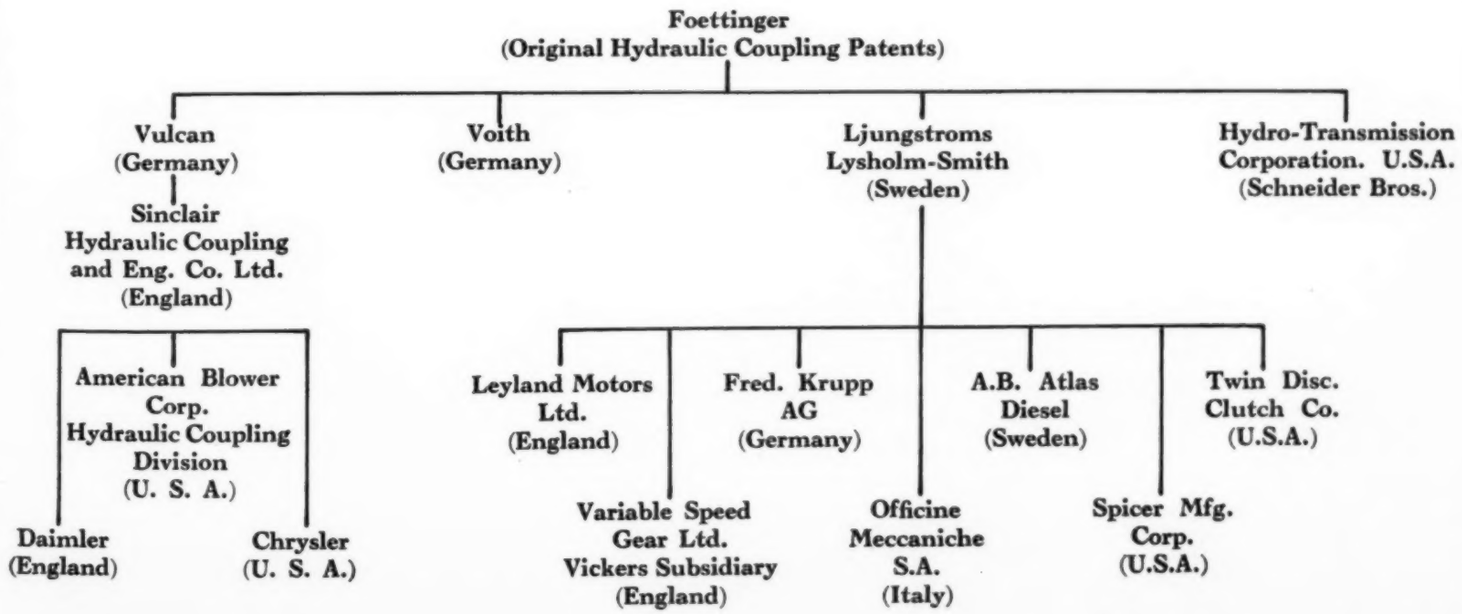
verter. The construction of the converter is based on the hydro-kinetic principle. Its operation depends on the circulatory movement of the fluid for the transmission of power. Because the hydraulic drive does not require a rigid connection between the engine and the driven equipment, the fluid drive, attained with a converter, absorbs the cyclic variations of an engine, shock loads, and provides for extremely smooth starting of the load.

At this point, I would like to review the family tree, so to speak, of both the hydraulic coupling and the torque converter, and the chart shown herewith simplifies this explanation. The original hydraulic coupling was designed by Professor Foettinger in Germany about 1913. All other couplings designed are subsequent improvements on the original patents which, however, have now expired. It will be noticed that the hydraulic coupling developments and the hydraulic torque converter developments in this country stem from the original Foettinger development. In our January, 1939, issue, on



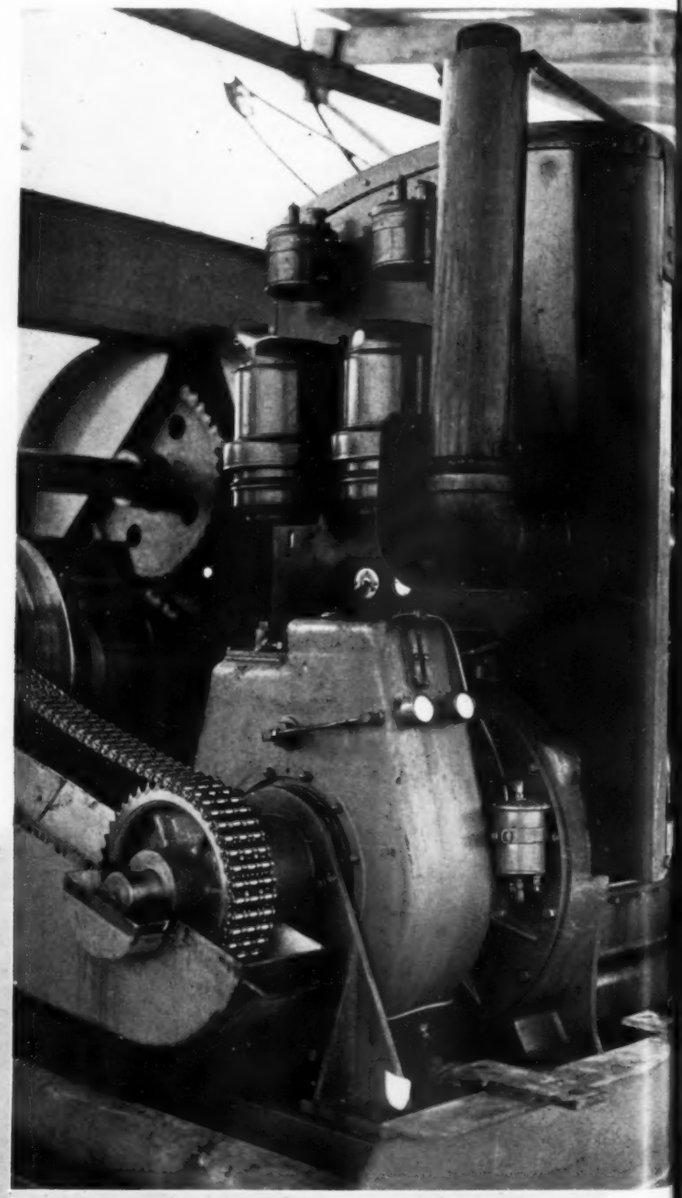
An Oil Well Supply Company's directly-connected rotary table with Waukesha engine and Twin Disc Torque Converter in successful operation on Pure Oil Rig at Clay City, Illinois.

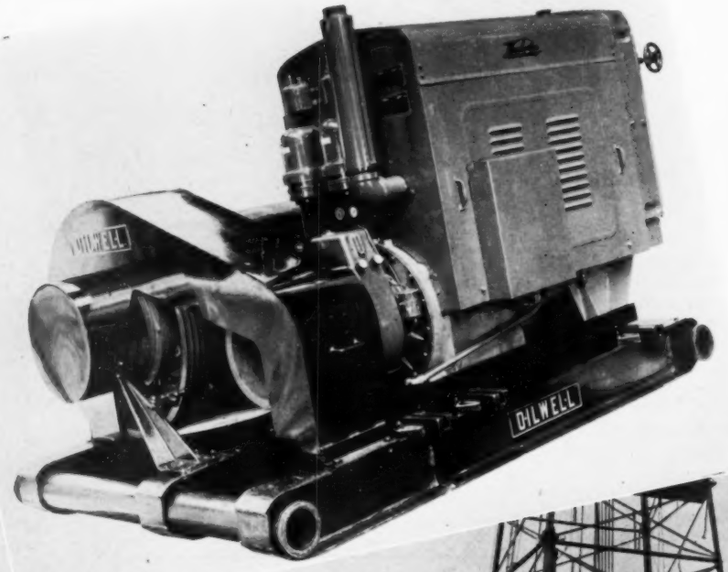
List of Manufacturers of Hydraulic Coupling and Torque Converters and their Relative Connections



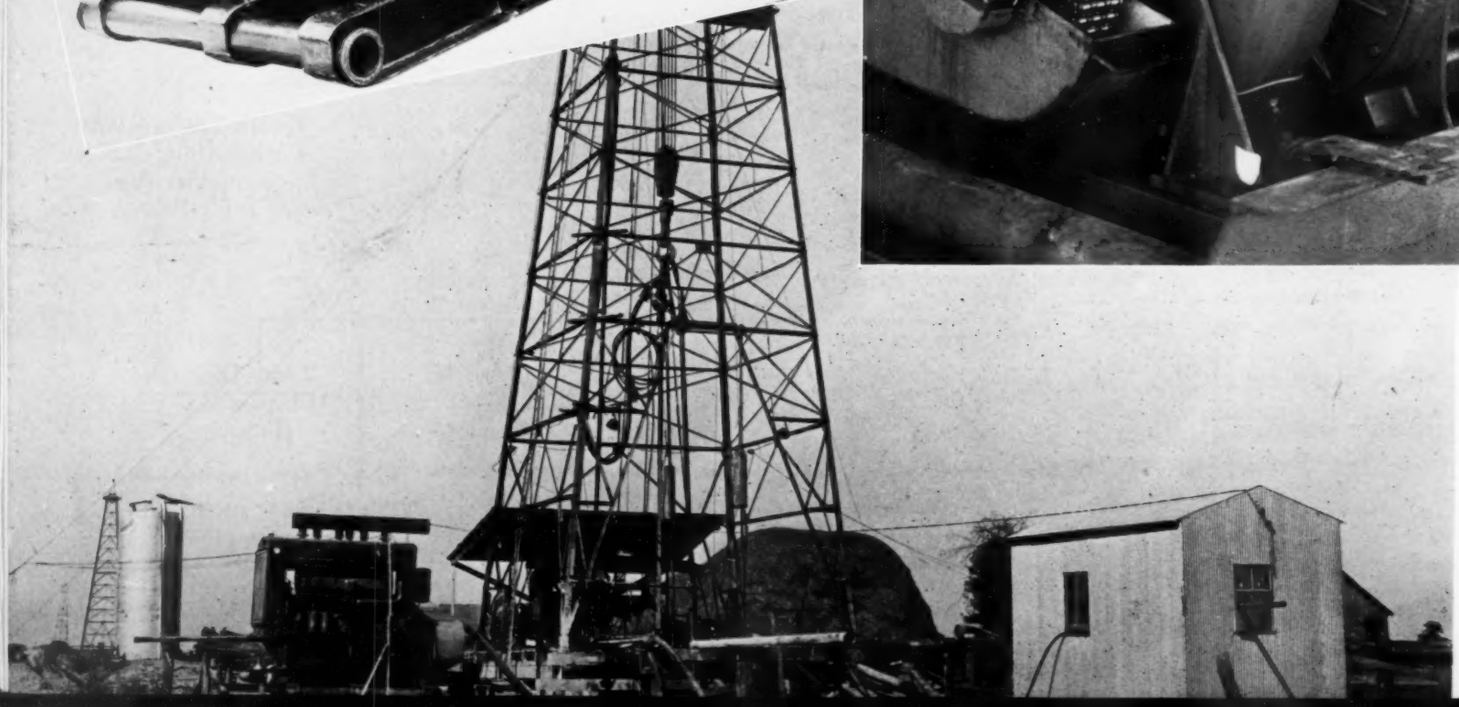
pages 30 and 31, we briefly described the hydraulic transmission used by the Yellow Truck & Coach Mfg. Company in their buses and produced by the Spicer Mfg. Corporation. This is practically the same type of torque converter as is now produced by the Twin Disc Clutch Company for industrial applications. In our May, 1939, issue, on pages 48 and 49, we briefly describe and illustrate hydraulic coupling applications made by the Hydraulic Coupling Division of the American Blower Company in our oil fields. These units are made under license from the Sinclair Hydraulic Coupling & Engineering Company of England. This same type of coupling or fluid fly wheel is used by the Chrysler Corporation in some of their automobiles. The Oldsmobile people in their 1940 cars are announcing a somewhat similar type of fluid fly wheel but in connection with an automatic transmission. This fluid fly wheel is a development of the General Motors Corp. through their Oldsmobile unit.

In the September, 1939, issue of DIESEL PROGRESS, on pages 19, 20, and 21, we described and illustrated the application of the Schneider torque converter to a switching locomotive; so we have American Blower Company, through their Hydraulic Coupling Division, supplying hydraulic couplings for both industrial and automotive use; we have the Spicer Mfg. Corporation supplying both torque converters and hydraulic couplings for automotive application the Twin Disc Clutch Company supplying torque converters and, I understand later, hydraulic couplings for industrial applications; and the Hydro Transmission Corporation of Hamilton, Ohio, supplying the Schneider Brothers type of torque converter for railroad and industrial applications — all, in effect, following the same general principle but dif-





Oil Well Supply Company's No. 4 hoisting unit with Waukesha engine and Twin Disc Torque Converter as operated by E. F. Moran, drilling contractor, on the Schuh Lease near Grayville, Illinois — Three views.

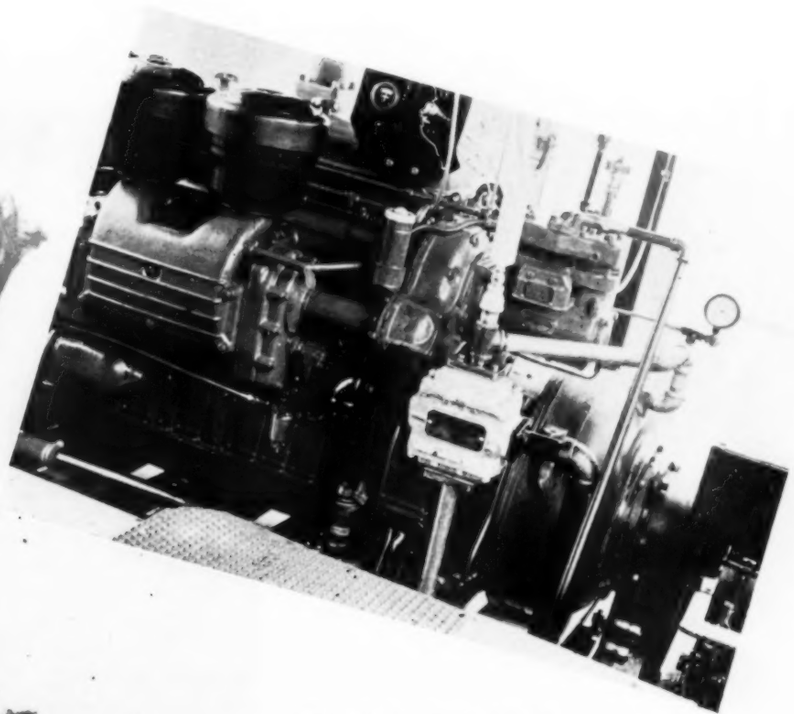


fering in design and manufacturing details.

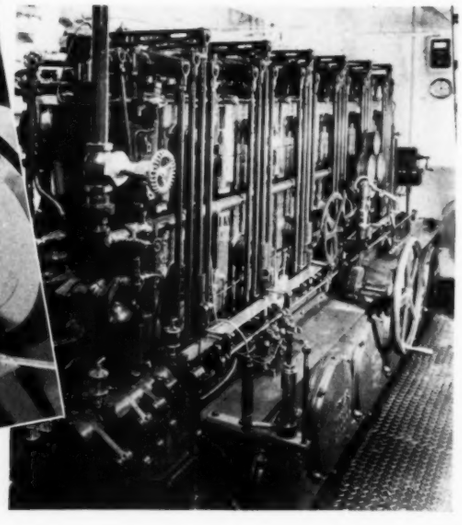
Amongst some of the successful applications of the hydraulic torque converter, developed by the Twin Disc Clutch Company, might be mentioned oil field installations, where the torque converter has been readily accepted as an ideal solution of the power transmission problems. The outstanding application is, of course, that of hoisting in rotary drilling service. Converters have been installed on different types of drawworks (see illustration). The elimination of shift and gear changes have proven that considerable saving of time in hoisting operations can be effected. This, of course, results in increased production because the hoisting operations required for changing of the drilling bits, etc., are non-productive operations. The faster they can be accomplished, the more time can be spent in actual drilling. One of the most interesting and revolutionary oil field installations which has been made to date is that of the direct-connected rotary table drive. Such drives have been previously made with steam engines.

The application of the torque converter to the internal combustion engine used provides the equivalent of steam engine performance. It can be truthfully said that operators have used internal combustion engines in oil field service because they were the most economical power source, because they were lighter and easier to transport from one location to another, because they did not require a large water supply for their operation, but they have not used them because they liked their operating characteristics. Now, with the application of a torque converter to an internal combustion engine, they can combine the economy, portability, etc., of the internal combustion engine with the flexibility and the desired performance characteristics of the steam engine.

Another interesting installation typifying the successful application of the Twin Disc torque converter is illustrated on this page. This unit is a standard Ohio Locomotive Crane Co. locomotive crane equipped with a six cylinder General Motors Diesel and a Twin Disc torque converter. In this installation the torque converter is used as the main power transmission unit between the engine and the balance of the locomotive crane machinery. The advantages of the torque converter in this case are the flexible drive between the engine and the balance of the machinery, the infinite amount of speeds that are available for handling the various loads under all operating conditions, the control of the torque converter-speed range at the output shaft of the converter by throttle operation, smooth acceleration, high torque at low speeds, which is important for starting a long string of cars.



Six cylinder General Motors engine driving through a Twin Disc Torque Converter installed on a Ohio Locomotive Crane Company's locomotive crane—Two views.



"POLING BROS. No. 17"

Diesel tanker fleet expands

STRIKING proof of marine Diesel economy and dependability is furnished by the well-known tanker fleet of Chester A. Poling, Inc., operating out of New York Harbor to serve the Atlantic seaboard from New England to the Carolinas. The progress of this enterprise, initiated in 1909 by Chester A. Poling and his brother, Robert L. Poling, may be measured by the total capacity of their vessels which now approximates three and one-half million gallons with the latest addition of *Poling Bros. No. 17*. To their unqualified success in this field is linked inseparably the success of the modern Diesel engine for this exacting type of service. Not only have they specified Diesel propulsion and pumping engines for all new construction but, since purchasing their first Atlas Imperial Diesel in 1928 they have standardized upon this type for conformity of equipment and now have no less than eighteen such units in operation. Because of the broad experience of this company in building and operating a marine transportation business of such magnitude for the distribution of petroleum products, details of their latest ship command the attention of all concerned with marine tanker practice.

The *Poling No. 17* is an all-welded, self propelled bulk oil carrier built by the John H. Mathis Company of Camden, N. J., and has a liquid cargo capacity 154,000 gallons. She measures 125 feet in length by 27 feet in beam and has a depth of 11 feet at the low point of sheer. General appearance, as indicated by the accompanying illustration, is similar to the streamlined design adopted for this fleet in 1936, which is an exceptionally effective combination of utility with attractive lines.

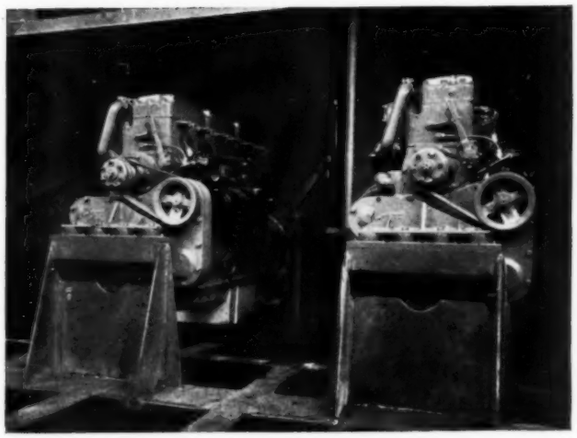
Main propulsion is furnished by a six cylinder, direct-reversible, Atlas Imperial Diesel rated at 300 hp. at 300 rpm. and directly connected to a three bladed, Columbian propeller. This main engine also generates electric power while under way through a Star generator V-belted to the tail shaft with 32 volt Exide batteries floating on the line. For auxiliary power in port a John Reiner unit is installed, which consists of a 10 hp. Stover Diesel, a 3 kw. generator, a Viking bilge and general service pump and a Quincy 2-stage air compressor, all mounted on a common base and arranged for any combination of operation that may be desired. Ample provision for cargo pumping is provided by another Atlas Diesel rated at 80 hp. at 650 rpm. and connected to two 8-inch pumps.

This unit with pumps is placed in a separate engine compartment well forward. All Diesels are fitted with spark arresting type Maxim exhaust silencers. Cylinder temperatures of the main engine are indicated by a 6-point Alnor pyrometer. A York oil-fired boiler insures plenty of heat for all service requirements. In addition to the customary sanitary and service pumps located in the main engine room, there is a jacket cooling water circulating pump thermostatically controlled to permit correct cooling of main engine cylinders under all conditions. This is entirely automatic in operation whether the engine is running or not. Gradual cooling after shut-down by this means minimizes scale formation with corresponding benefits.

General safety and particularly fire protection are emphasized on all Poling vessels and the new No. 17 is no exception. Both Kontrol foam and carbon dioxide extinguishers have been provided in suitable quantities. Their efficiency was given almost immediate test on the first trip from the builder's yard when a motorboat fire was sighted and put out, resulting in the rescue of four persons.

The full crew complement of the *Poling No. 17* consists of Captain, Pilot, two A.B.s, Chief Engineer, Assistant Engineer and Cook, or a total of seven. Four well appointed staterooms, each with hot and cold running water, steel lockers, and enamelled utility chests with mirrored doors provide comfortable personnel quarters. Ceilings are constructed of transite acoustical material and are laid on a two-inch layer of rock-wool. In addition to thorough soundproof qualities this type of construction has the added advantage of being fire-resistant. The galley with customary equipment and layout is completely aft and is well ventilated by three port holes and a skylight over the oil-burning range.

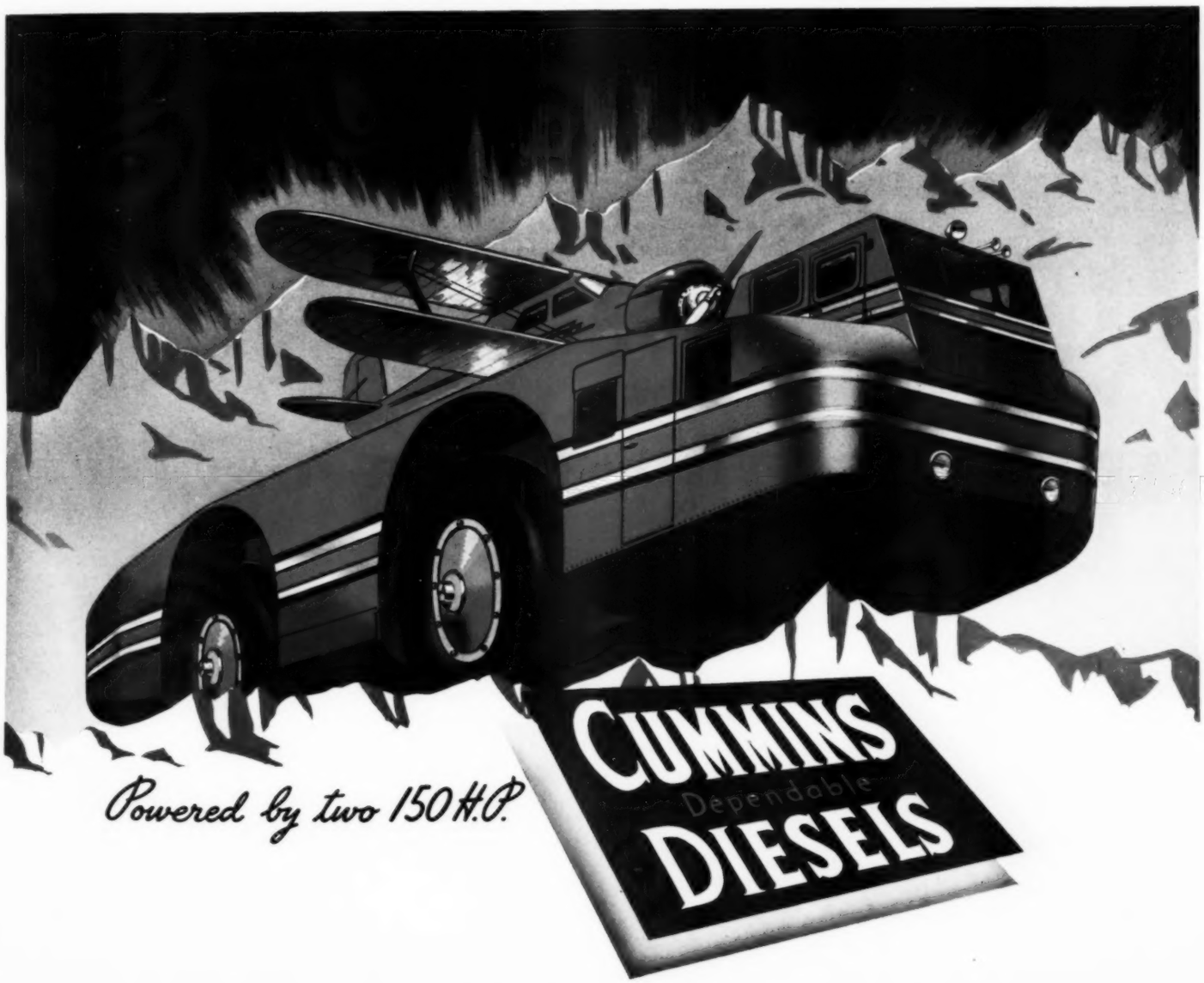
As this new addition to the Poling fleet enters service with the other vessels carrying the familiar C. A. P. insignia she represents all that is sound in design, construction and equipment for profitable tanker operation. Thirty years of first-hand experience on the part of her owners in connection with safe, dependable and economical petroleum distribution guarantee her earning power as an integral unit of a carefully planned organization.



★ The Snow Cruiser—a moving research base, has to provide housing—light—warmth—food and transportation for a crew of four scientists for long periods without outside contact. The power plant had to have a record for dependability established through thousands of similar units already in operation. The engines must be instant starting, readily adaptable to frigid climates—smooth and flexible—simple and easy to maintain and service. One engine met all the specifications—the Cummins Dependable Diesel. Send for complete details. Cummins Engine Company, SC16 Wilson Steet, Columbus, Indiana.

SNOW CRUISER

ANTARCTIC EXPEDITION • RESEARCH FOUNDATION OF ARMOUR INSTITUTE OF TECHNOLOGY • PROJECT No. 1-69



Powered by two 150 H.P.

Cummins Diesel equipped "Snow Cruiser" for Admiral Byrd's Antarctic Expedition. Overall length 55 ft. 9 in. Overall width 19 ft. 9 in.

Fifty-five foot "Snow Traveler" which carries provisions, fuel, etc., for a full year—manned by a crew of four men —able to map and explore in one month more territory than all previous expeditions combined.

ADMIRAL BYRD'S SNOW CRUISER

By DWIGHT ROBISON

POWER for the $150,000 Snow Cruiser, which the Research Foundation of Armour Institute of Technology has designed for the government's forthcoming Antarctic Expedition, is being furnished by two Cummins 150 hp. Diesel engines, each direct-connected to a General Electric generator. These twin Diesel-electric generating sets will not only furnish motive power for the cruiser, but will also supply all the current for cooking, lighting, heating, operation of scientific equipment, etc. Aboard the *Snow Cruiser*, the two generating sets are installed side by side, just forward of the front wheels. Large supplies of fuel and lubricating oil for the Diesel engines are carried in six storage tanks which have been built into the Cruiser. Since the *Snow Cruiser* expects to remain in the Antarctic regions for a period of three years – far away from sources of supply and repairs – its designers made an exhaustive study of possible power sources before selecting Diesel to drive the generators. One of the first factors taken into consideration was the need for engines which would start easily in the sub-zero temperatures of the Antarctic. Diesels easily qualified in this respect, as an investigation revealed many Diesels operating in regions where the temperature is consistently as low as 40 degrees below zero, without any starting troubles. Other factors in favor of the Diesels included their economical use of fuel and lubricating oil, which will not only reduce fuel costs, but will give the *Snow*

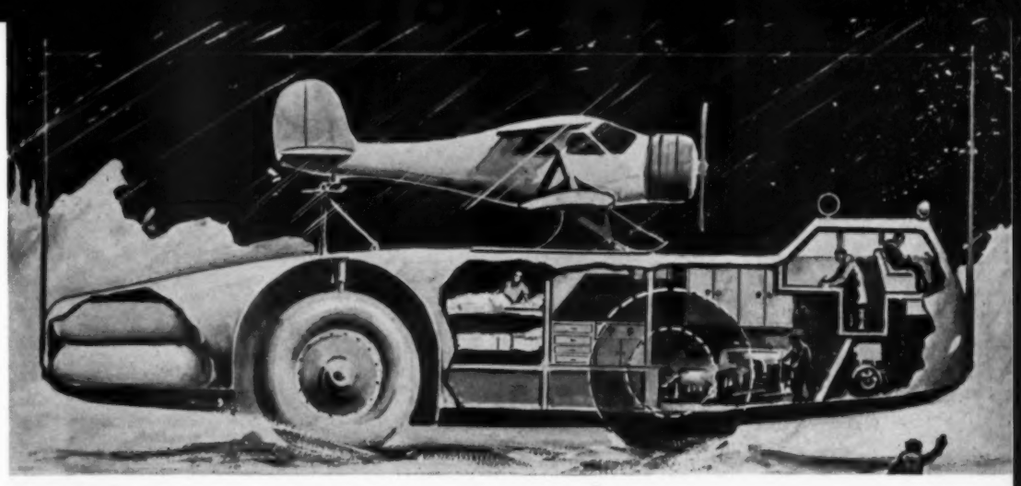
Cruiser a maximum cruising range and, at the same time, conserve the space required for fuel storage tanks; the simplicity of the engines which eliminates the necessity of carrying a specially trained mechanic; and their compactness and low weight per horsepower, which has enabled the *Snow Cruiser* designers to hold down the engine room space and the weight of the entire Cruiser as well.

Together, the two generating sets will provide more than enough power for the anticipated peak loads. Each unit may be operated independent of the other and when the load is light, one of them will serve as a standby unit, giving the Cruiser full protection against a breakdown or any other emergency.

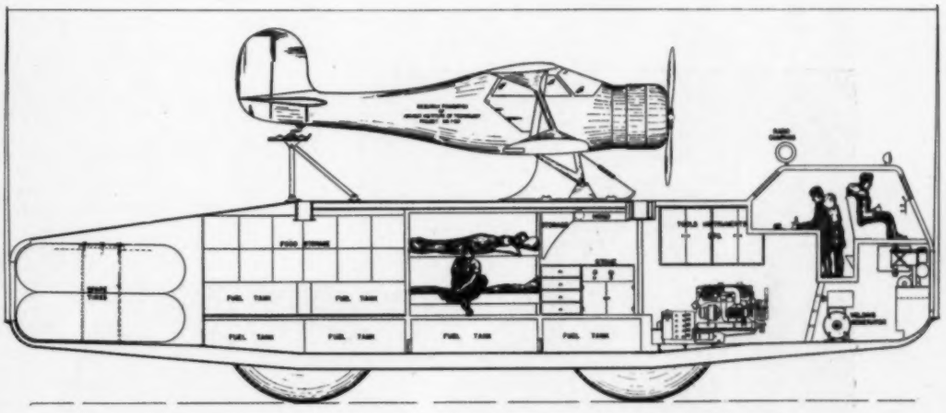
As unique a self-propelled vehicle as was ever produced by man, the *Snow Cruiser* will carry provisions for one year for a crew of four men, will carry a complete scientific laboratory, and will make it possible, by means of an aeroplane transported on its top deck, to explore a strip of territory 600 miles wide. Capable of traversing 15-foot crevasses, propelled by any one or all four of individually-driven wheels, the *Snow Cruiser* unit will be able to map and explore in one month more territory than all previous expeditions combined.

Built in the plant of the Pullman Standard Car Mfg. Company, Chicago, the framework of the four-wheeled monster is constructed of high tensile steel structural members, fused into one single homogeneous structure by the modern shielded arc process of electric welding, using the latest equipment made for the purpose by the Lincoln Electric Company of Cleveland.

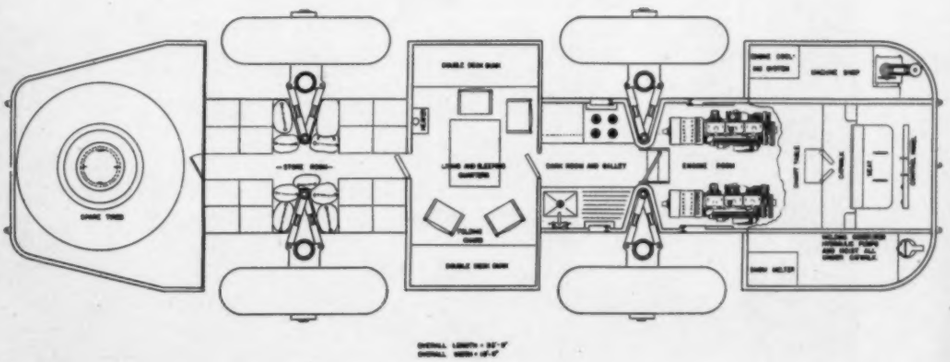
Utilized so effectively in construction of the *Snow Cruiser,* arc welding will also be an extremely important adjunct to the polar vehicle's permanent equipment, for a Lincoln arc welding generator of 200 amp. capacity, fitted for belt drive, will be permanently installed, together with a kit of Lincoln arc welding electrodes. The welder will be a necessary tool for the cruiser's machine shop, where it will be used for all sorts of necessary repairs, such as the welding of broken or worn machine or structural parts, the fabrication of miscellaneous devices and equipment. Indispensable in many ways, the welder may be used for charging batteries and for supplying power to raise or lower the wheels. It may also be used in an emergency to supply current for lighting or for operating tools, even starting the Cummins Diesel engines with which the *Snow Cruiser* is equipped.



Here is how Ed. Gunder, N.E.A. service staff artist, visualized Admiral Byrd's "Snow Cruiser" from the original drawings. Principal details of layout are well brought out in this drawing. The "Snow Cruiser" was designed by the staff of the Research Foundation of Armour Institute of Technology as a fundamental research project, under the direction of Dr. Thomas C. Poulter, scientific director, who was second in command and senior scientist of the Byrd Antarctic Expedition No. 2.



The "Snow Cruiser" can cross ice chasms. It is so built that its projecting nose will overhang any crevasse it is likely to meet. It is driven up to the edge until the front wheels meet the rim, then the front wheels are retracted up into the body. This lowers the nose until it rests flush on the ice on the far side. Then the rear wheels push it forward until the front wheels are above the far edge of the ice surface, then down come the front wheels and up come the back wheels, and the front wheels pull the rest of the ship across the chasm. The rear wheels are then dropped again and away she goes.



GIVE YOUR INTERNAL COMBUSTION ENGINE

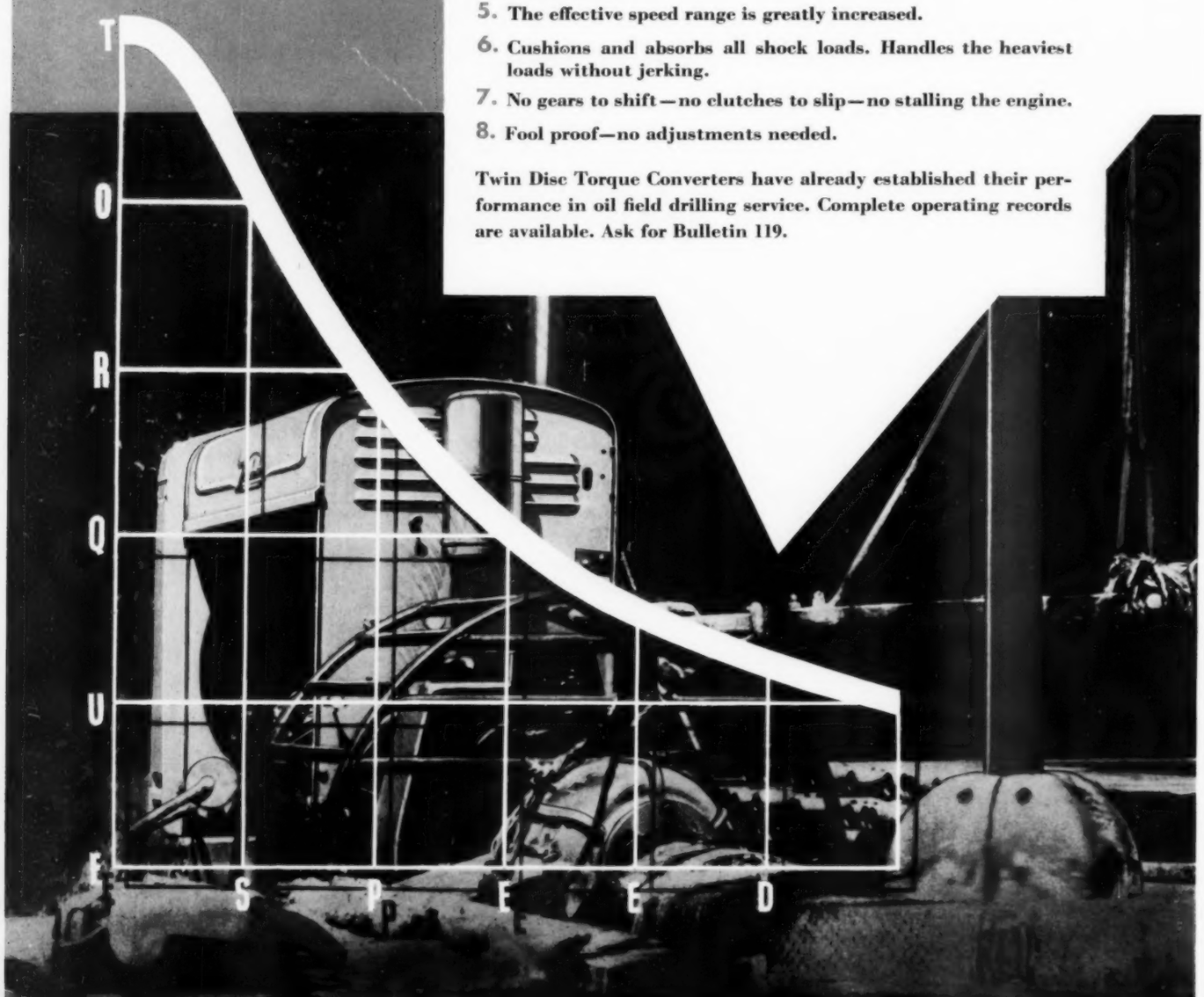
True Steam Performance

Illustration shows the application of the Twin Disc Torque Converter to the internal combustion engine. In rotary drilling service, shock loads encountered are cushioned out and not transferred to the engine. The only control required for operation is the throttle.

Equipped with a Twin Disc Torque Converter, your internal combustion engine will have true steam engine performance because:

1. The Twin Disc Torque Converter permits the engine always to be operated within its most efficient range.
2. It greatly increases the delivered torque at low speeds.
3. It provides the flexibility and smoothness of steam.
4. Only one control—the engine throttle—for the entire torque speed range.
5. The effective speed range is greatly increased.
6. Cushions and absorbs all shock loads. Handles the heaviest loads without jerking.
7. No gears to shift—no clutches to slip—no stalling the engine.
8. Fool proof—no adjustments needed.

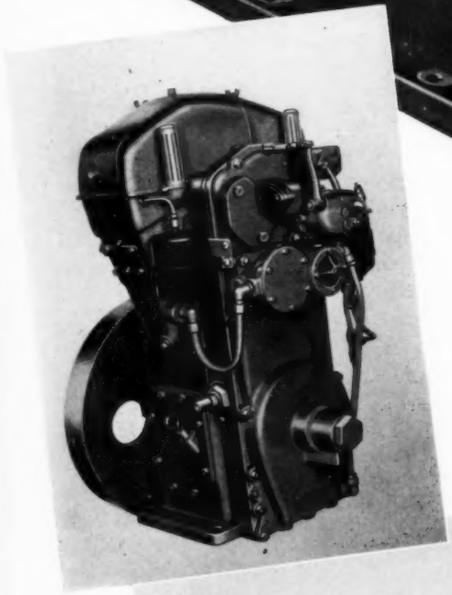
Twin Disc Torque Converters have already established their performance in oil field drilling service. Complete operating records are available. Ask for Bulletin 119.



TWIN DISC CLUTCH COMPANY · 1345 RACINE STREET · RACINE, WISCONSIN

FAIRBANKS-MORSE ANNOUNCES!!

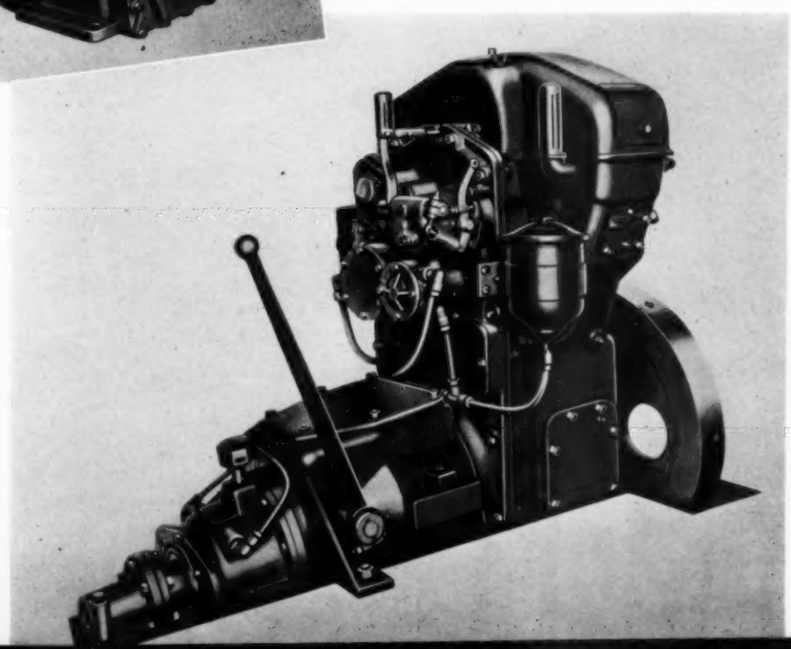
By REX W. WADMAN



Two cylinder V-type Fairbanks-Morse Model 45 with direct current marine type generator.

Two cylinder F-M Model 45 Diesel power unit.

Twin V-Type Fairbanks - Morse Diesel marine engine with Joes 1:1 ratio reverse gear.



CHICAGO, Oct. 11th. The importance of the small Diesel engine market was given added impetus here today when Fairbanks-Morse unveiled their new line of 5 and 10 hp. four cycle Diesels.

Unique in many respects but outstanding in that the two cylinder unit is a V-type mounted on what might be described as the same chassis as the single cylinder unit. In other words, the installing dimensions of the one and two cylinder engine are identical except as to the auxiliaries driven.

The Model 45 Fairbanks-Morse Diesel engine is a four cycle, solid injection, 3½ in. x 4¾ in. engine, precision built with full pressure lubrication and operating at 1,200 rpm. Readily started by hand. The crankshaft is supported by Timken roller bearings. American precision bearings for the crankpins and Allen bronze piston pin bearings are diamond bored. The two cylinder engine has, of course, both connecting rod bearings on a single crank pin side by side.

Sealed Power Corporation supply the liners and pistons. American Bosch fuel pumps and nozzles. Pierce Governor. Purolator oil and fuel filters. Tuthill lubricating pump. Thompson valves. Wausau piston rings.

Rated at 5 hp. for the single cylinder and 10 hp. for the twin V-type, it is supplied in 3 and 6 kw. capacity for electric generating sets, either for industrial or marine service.

Installing dimensions are exceptionally compact. For instance, the width with reverse gear for the marine engine is but 1 ft. 11¾ in for both the one and two cylinder unit. The length with reverse gear is but 2 ft. 9 in. for the single and 2 ft. 11 in. for the twin V-unit. The height is the same for both – 2 ft 11½ in. Generator units are equally compact – length 3 ft. 10 in. for the single and 4 ft. 1 in. for the twin. Height – 3 ft. 3¾ in. for both units. Width – 1 ft. 10 in. for the single and 2 ft. 1 in. for the twin.

A splendid pair of engines to meet the ever expanding market for small marine applications; for small manufacturing plants; machine shops; service stations; tourist camps; ranches; amusement parks; and an endless variety of other small light and power uses.

15 WEST 81st STREET NEW YORK CITY

By WILL H. FULLERTON

AFTER establishing itself as a reliable source of industrial power for the small isolated plant, the modern Diesel engine is demonstrating its ability to compete with local utilities in supplying power and light to the fashionable apartment buildings in New York City.

Notable among recent applications is the installation by the Cummins Diesel Engine Corporation of New York of three 100 kw. Diesels in the apartment at 15 West 81st Street, New York, N. Y. This building is operated by the H. R. H. Management Company, who employed the well-known engineers P. R. Moses, S. R. Klein and Associates to act as consultants for this installation.

General view of the new engine room. Considerable space was saved by mounting the exciters above the pedestal bearings of the generators, and connecting them through V-belts. Note Donaldson air cleaners.

The plant consists of three 6-cylinder Cummins engines with 7″ bore and 9″ stroke operating at 720 rpm. Each engine develops 141 continuous hp. with 75 lbs. BMEP and is capable of carrying a 25 per cent overload for two hours, as are the Electric Machinery 156 KVA, 64 per cent PF, 3-phase, 60-cycle, 208/120 volt generators. The units are solid coupled with belt driven exciters mounted above the generator pedestal bearings. The concrete foundation is floated on cork with fuel, air and water piping in suitable trenches to provide access and give the engine room a trim appearance. The interior of the room has been tiled for cleanliness. The ceiling is soundproofed with perforated metal tile and rock wool backing suspended on cork hangers.

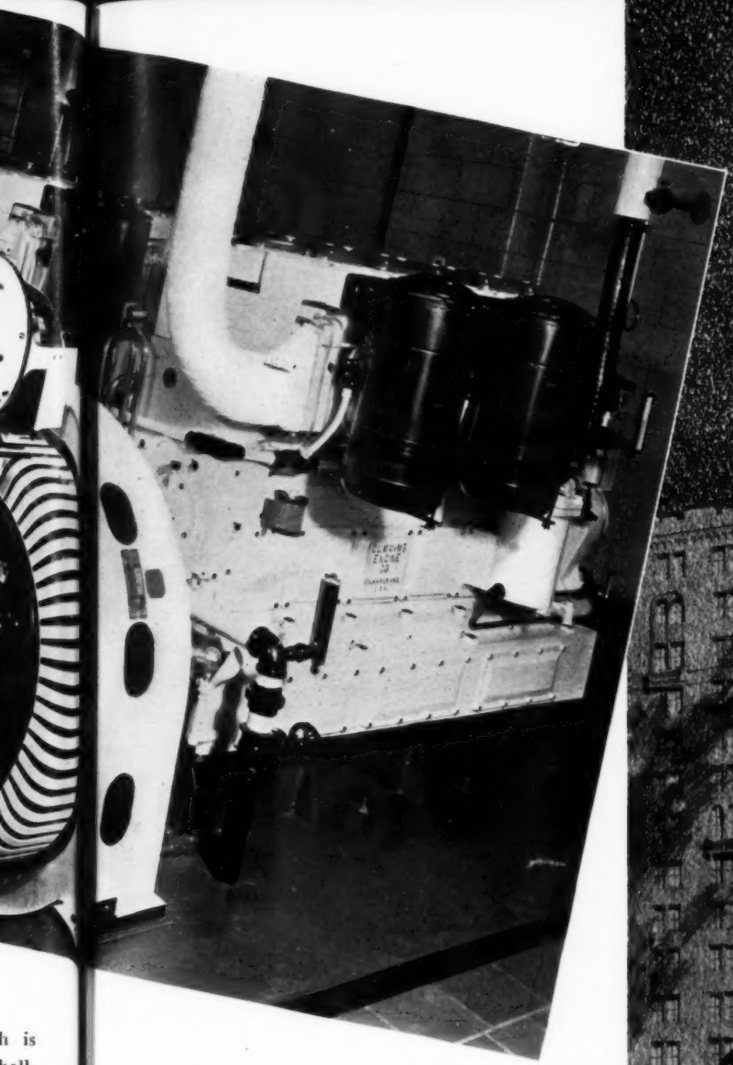
The accompanying pictures and plans show the neat arrangement of vital auxiliaries which are all in duplicate to insure continuous operation of the plant.

Adjacent to the engine room the large oil burner fuel tank has been provided with a 3,000 gallon section for Diesel fuel which is pumped by either of the two electric driven transfer pumps to a day tank with King Tully gauge and electric float switch control. A Roper hand pump augments the two electric units in case of emergency. The fuel is metered by the two Vesta meters manufactured by Fluid Meters, Inc., mounted adjacent to the fuel tank. Dual lines carry fuel to the engines.

A pair of Curtiss compressor units insures an ever-ready supply of starting air for the engines. One compressor is electrically driven and arranged for automatic control to maintain a constant pressure of 300 to 350 lbs. in the dual Scaife air tanks, which are equipped with Lunkenheimer relief and blow-off valves. The gasoline engine driven compressor is used for initial starting or emergencies.

The engines are cooled by transferring the heat from the jacket water to the domestic hot water supply. A unique closed system is employed for this transfer. Cold water under city pressure is drawn from the bottom of the hot water storage tanks by one of two Dayton Dowd centrifugal pumps. The pumps force it through the tubes of a Sims vertical heat exchanger and back into the top of the storage tanks. Heat is absorbed in the passage through the heat exchanger which carries in its shell the hot jacket water. This hot jacket water is discharged from the engines and goes to a header which is connected to the top of the exchanger shell. After giving up its heat, the cooled jacket water is drawn from the bottom of the shell through a header back to the engine jackets by the engine pumps. A perfect counter flow heat transfer is thus effected. Controlling the rate of domestic water flow is a Fulton Sylphon valve with control bulb in the engine jacket water header which is maintained at 158° F. The jacket water returns to the engines at approximately 145° F. The domestic hot water returns to the storage tank at approximately 150° F. A second Fulton Sylphon valve provides a flow of cold water from city water mains directly to the engine jackets should the temperature of the engine outlet water exceed 165° F. A pressure relief overflow is provided to open the engine surge tank with overflow to the sump. The jackets are kept full by the surge tank with ball cock. Engine jackets and header are all vented to the surge tank.

In the accompanying pictures will be noted a pair of columns projecting through the engine room ceiling. These columns, which rest on Korfund Balanced Isolators, support the whole exhaust system. This system consists of three Maxim silencers connected to the engines with

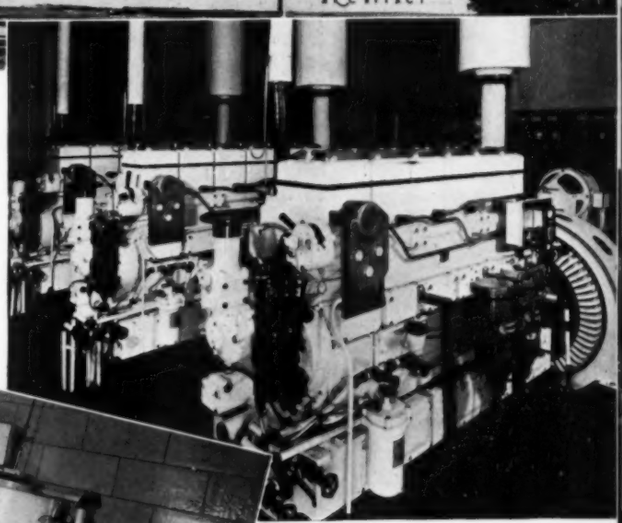


United Metal Hose Company flexible corrugated bends. Silencers are flanged to 8″ steel headers that run approximately 40′ to the stack in which a special Maxim wave trap is installed to prevent pulsation. The floor mounting of the exhaust system has prevented any vibration from getting into the building structure and the combination of silencers and wave trap render the exhaust noiseless.

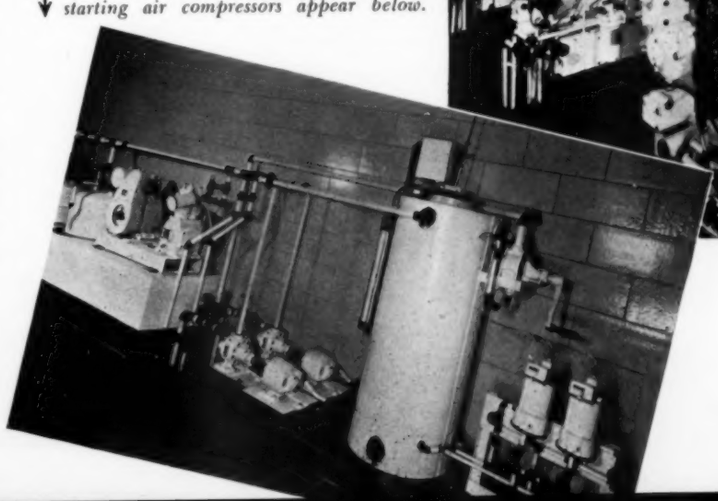
All of the above mentioned auxiliaries derive their power from the engine room auxiliary panel shown at the extreme right of the switchboard in the accompanying pictures. This dead front board, manufactured by the Empire Switchboard Company, is made up of five sections – three generator control panels, the feeder panel and engine room auxiliary panel. Each generator panel mounts an ammeter with switch, exciter voltmeter and ammeter, with synchronizing switch and voltmeter switch. A discharge resistor and switch connect excitation to the field and same is regulated with exciter rheostat shown. Each generator has its voltage regulated by means of the high speed Ward Leonard electronic voltage regulator shown in lowest section of each generator panel.

15 West 81st Street, New York City, is now converted to economical Diesel-generated light and power.

Operating side of the three Cummins Diesels showing Nugent filter in front foreground and Skinner filters in duplex further back. →



Fluid meters, fuel transfer pumps and starting air compressors appear below.



A dual bus system is employed with two three-pole disconnect switches for each generator providing connections to either or both buses. A swinging bracket carries a set of synchronous lamps, Synchronoscope, and three voltmeters. One voltmeter is connected to each bus with the third available to read incoming machine voltage with connection to it controlled by the generator panel. This provides quick comparison of voltmeter readings for synchronizing. The feeder panel has a 3-pole fused main disconnect for power and a second for light with frequency, kilowatt, and kilowatt-hour meters for each of the two services. The board has been placed between two building columns which are flush with engine room wall. A partition from boiler room to engine room wall forms a small room behind the switchboards, which makes the rear of the board accessible, provides storage space for tools, etc., and allows access to ventilating blower gallery.

Three Clarage 7,000 CFM dual furnace fans with inlet boxes are mounted on top of the ash removal passageway which runs along adjacent to the west engine room wall at approximately the same level. This passage communicates with the street through the ash removal hoistway which has been provided with a subway grating to admit air. The blowers have been located over holes in the ceiling of the ash removal passage and suck air therefrom through Libbey-Owens-Ford filters mounted on the ceiling directly under blowers. The fans force this air into the engine room along the west wall at the ceiling with louvres for directing the air to any desired level. Similar outlet grills in the east engine room wall allow air to pass out into space between the oil storage tank wall and the engine room wall. This space connects with the chamber above the engine room ceiling and air passes across the ceiling and out through Celotex baffles into the passageway leading to the street.

It will be noticed that extreme care has been taken to provide continuous care-free service in this plant. To further this end, engines have been equipped with Skinner and Nugent lube oil filters, Donaldson oil bath air filters, Nugent fuel filters and Harrison oil coolers equipped with a special Dayton Dowd water circulating pump. All piping for water is brass, fuel pipe is iron and air piping steel. All hot water pipe is covered with single standard asbestos, all cold water with hair felt, and all exhaust with double standard magnesium. Wiring from generators to the switchboard is lead covered in fiber ducts. All auxiliaries are wired with lead covered cable in steel conduit. All engine room auxiliaries are equipped with thermal protection. Alarms are provided for engine high jacket water temperature, high lube oil temperature and low lube oil pressure.

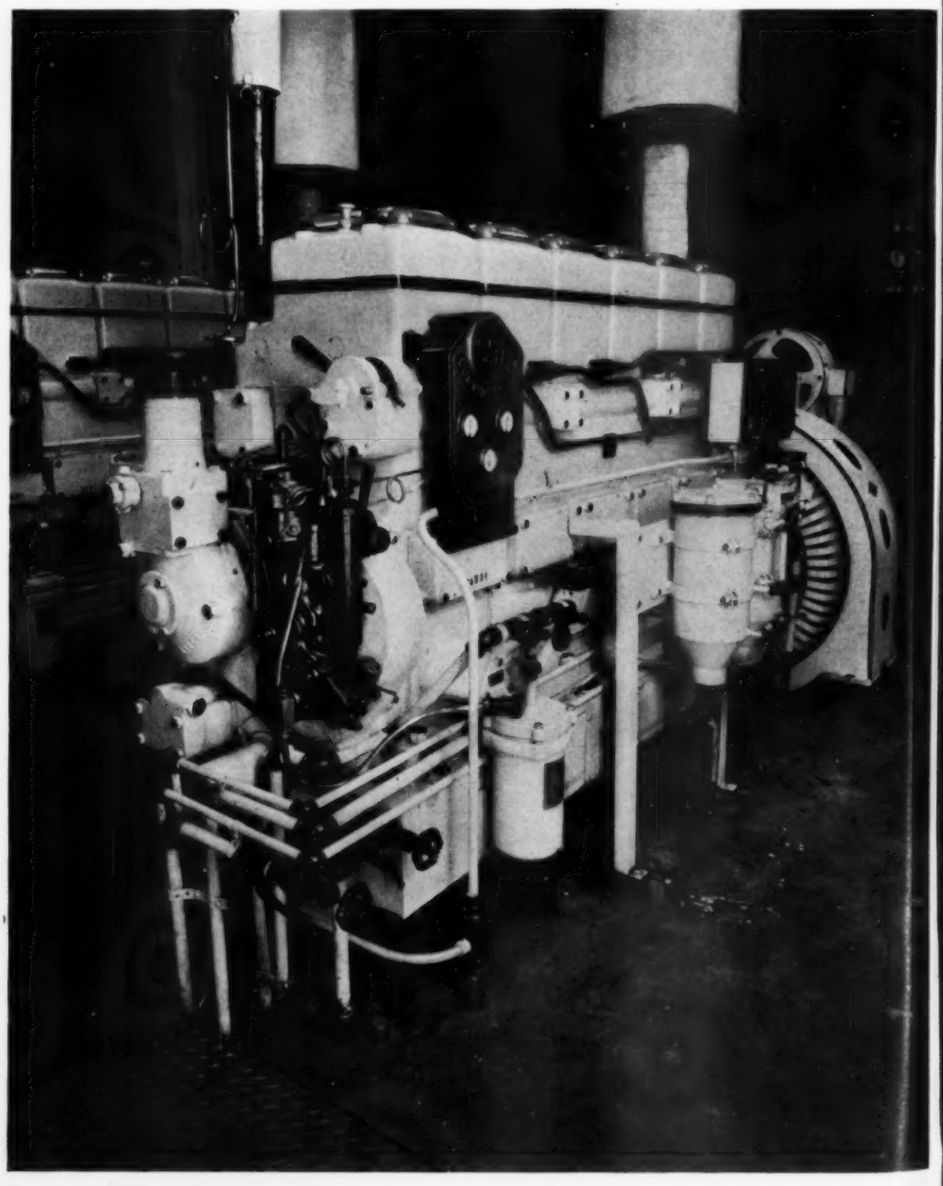
The lighting load in this plant varies between 45 and 80 kw. over the average day, the 80 kw. occurring for a short time in the evening. This load is handled by one engine. A power load which a second engine handles is made up of engine and boiler room auxiliary, house pumps and eight elevators. This load varies from moment to moment between zero and 150 kw., the most violent surges occurring during the evening between 5 P.M. and 8 P.M.

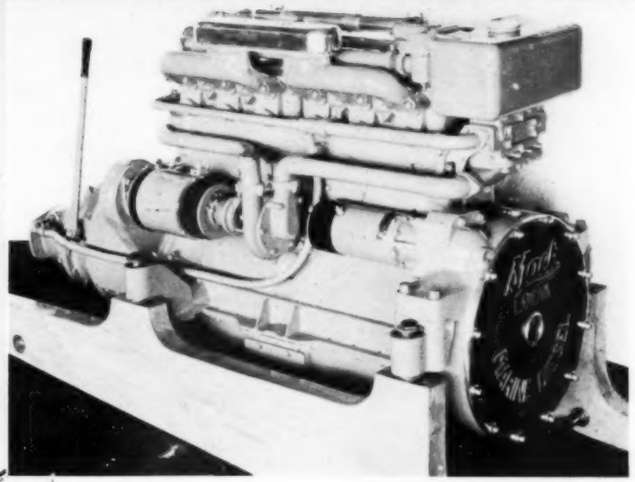
It will be seen from this that a balance has been struck between efficiency and dependability, allowing a comfortable margin of reserve with freedom from light flicker of any description.

During the first two months of operation, the plant produced 5,290 kwhrs. of power and 37,800 kwh.'s of light, for a total fuel and lube oil cost of $499.67. An additional economy was the saving of 70 gallons of oil burner fuel per day with the jacket water recovery system. This realizes a long planned economy in building operation by the H. R. H. Management Company. Mr. S. Ravitch, Mr. S. Horowitz, and Mr. M. Hyman have demonstrated, to the apartment house management field, real courage, foresight and busines acumen in pioneering this excellent application of the modern Diesel.

Thus, these three Cummins Engines have shown the practicability of the small isolated power plant for apartment houses where load swings are vicious, where service must be dependable and where economy of operation is obtained.

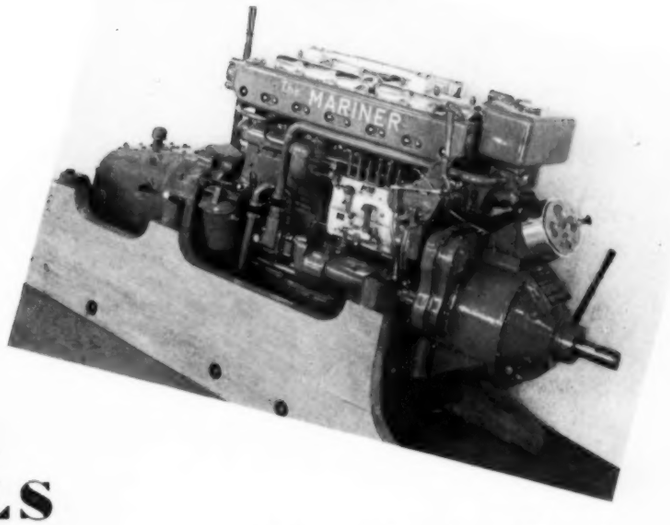
Close-up of operating side of one of the three Cummins Diesels installed in the apartment house at 15 W. 81st Street, New York City. Cummins fuel pump and distributor are in the immediate foreground.





Type Y Mack-Lanova Diesel engine with in-built reverse gear and flywheel mounted forward. Rated at 120 hp.

Type W Mack-Lanova Diesel engine arranged for power take-off at the forward end. Rated at 100 hp.



MACK-LANOVA MARINE DIESELS

TUCKED neatly away in the cockpits of the 42 ft. sport fishing boat *Juliana* and the 45 ft. *Ranger,* for the last sixty days, two new Mack Marine Diesel engines, Type Y and Type W respectively, have set the die for the engraving of an important name in the roster of Marine Diesels.

Little over a year ago, Mack Trucks, Inc., made the now famous Mack-Lanova truck and bus Diesel available to the trade. Long months of engineering and laboratory research, backed by forty years' experience in building heavy duty truck engines, went into those first Mack-Lanova Diesels.

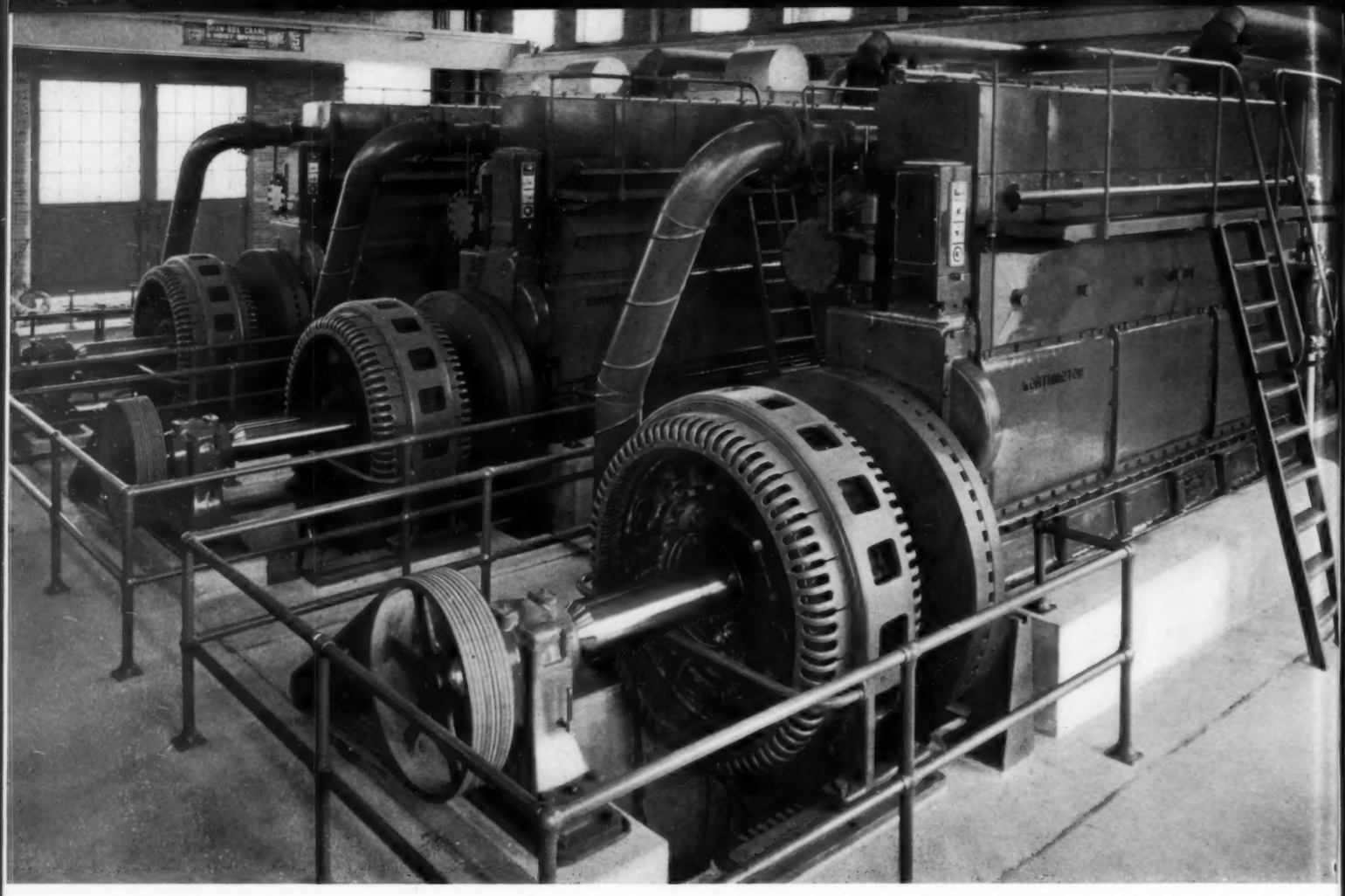
Now it seems natural that Mack Trucks, Inc., with factory branches at twenty-eight tidewater and fourteen fresh water ports in this country, as well as dealers in twenty-four foreign ports, should bring forth a promising Marine Diesel. Known as the Mack Mariner engines and designated as Type W, for work boats, and Type Y for yachts, the new Diesels embody the accepted, and the latest features in Marine Diesel engine design with compactness, dependability and economy standing out.

Today, a select few witnessed the performance of Mack-Lanova Type Y, 120 hp. engines from instantaneous button-controlled electric starting, through a fast run out Long Island Sound aboard the *Juliana.* The engine turning up at 1,500 rpm. put this trim deep sea fishing boat through the water at eleven miles per hour, with a good 300 rpm. in reserve. Smoothly and quietly, this remarkable Diesel responded to the throttle in acceleration and deceleration, showing fast maneuverability through the reverse gear. No sign of exhaust smoke was manifest at any point throughout the speed range.

Just as the Mack-Lanova Diesel truck engine grew out of the long experience of Mack Trucks, Inc., so has the Mack-Lanova marine engine been developed from the now accepted truck Diesel. It is, in fact, essentially the same engine adapted to the requirements of marine service. The Type Y Diesel is arranged for propulsion drive only with reverse gear at the rear and flywheel forward, where the Type W engine is built with flywheel at the propeller shaft coupling end where it will take up clutch and propeller shocks commonly more severe in work boats. The Type W engine is arranged for power take-off at the forward end which makes the engine available for auxiliary driving duty, such as in trolling, operation of hoists and pumping. The only other distinguishing feature between the two types is that the power rating is 120 hp. for the Type Y and 100 hp. for the Type W.

Built-in accessories are common to both types and consist of Twin Disc helical gear, clutch and reverse gear with full speed reverse, Harrison heat exchanger for closed fresh water cooling system, American Bosch fuel injection pump, and plunger type fuel transfer pump, Pierce centrifugal full range governor, Zolner aluminum alloy T-slot pistons, Leece-Neville 32-volt generator and starting motor.

These are full Diesel, 4-stroke cycle, 6-cylinder engines. The cylinder heads are cast in threes and are equipped with the well-known Lanova combustion system. The quiet performance of the Mack-Mariner engine typifies the smooth, shockless flow of power produced by controlled combustion in the Lanova system. All of the shock producing factors, such as peak pressures, compression ratios and injection pressure, are allowably lower, resulting in lower bearing shock and generally all around smooth operation.



The three Diesel generating units at Vestaburg, Michigan. Note Woodward governors, also Shaw-Box traveling crane serving all three engines.

VESTABURG, MICHIGAN

By R. D. CAMPBELL

IN the very center of Michigan is the town of Vestaburg, so small that it may be difficult to find it on the map, but it is an important place as far as several thousand rural Michigan homes are concerned. It is the location of the newest and largest of generating stations supplying power for the Tri-County Electric Co-Operative. By the way, Tri-County is a misnomer for the project now is serving over 80 townships in 13 central Michigan counties. The Vestaburg plant is the only all Diesel plant in the system which will include six generating stations with various combinations of hydro, Diesel, and natural gas generating units. It began producing power on May 26, 1939, and will constitute the main or base-load plant for the system.

The generating units consist of three 6 cylinder 500 hp. Worthington Diesel engines having cylinder dimensions of 13¼" x 17½" and turning 360 rpm. Each engine is directly connected to a 516 kva., 413 kw., 3 phase, 60 cycle, 2,400 volt Elliott alternator with V-belted 15 kw. 1,750 rpm. Elliott exciters. While each unit has a full load rating of 340 kw., the oversize alternators were selected to care for a possible poor power factor and fluctuating load conditions. The fourth unit, which is now being installed, is an 8 cylinder, 16" x 20", 1,000 hp. Worthington engine running 327 rpm. and directly connected to a 700 kw. alternator.

The fuel used is a Michigan distillate of 36° gravity, similar to a No. 3 fuel oil. The fuel is brought in from the refinery by tank car to the railway siding directly behind the plant. It flows by gravity to the fuel oil transfer pumps located in the engine room, and from this point it is forced into either of two 30,000 gallon vertical storage tanks located between the engine room and the railway siding. There are two fuel transfer pumps so connected that either or both may be used for unloading and

storing the fuel. Both pumps are Worthington Rotary type, one being a 1½" pump driven by a 2 hp. Westinghouse 900 rpm. motor, and the other is a 1" pump driven by a 1 hp. Westinghouse 1,200 rpm. motor.

There is a third fuel oil transfer pump which consists of a ⅜" Viking type F54D gear pump directly connected to a 1/6 hp. Leland single phase 1,730 rpm. motor. This unit is normally used to transfer the fuel oil from the outside storage to the overhead day tanks located between the roof trusses of the main engine room. During this transfer operation, the fuel oil is forced through two Skinner F912-29 Streamline Fuel Oil Filters which are arranged for parallel operation. There is a 150 gallon overhead day tank for each engine, and the fuel flows by gravity from the day tanks to the engines. The fuel oil level in each of the 30,000 gallon storage tanks is indicated by Fuel Levelometers, 12" dial Master Models reading from 6" to 35' 6". The fuel oil level in each day tank is indicated by Midget Levelometers. All of the fuel handling equipment, filters, and levelometers are conveniently grouped together in one corner of the engine room.

An interesting feature of this plant is the cooling system which is located within the engine room. A Buffalo Evaporative Type Cooling Unit takes the place of the usual cooling tower and heat exchanger. The cooling unit consists of a metal enclosed chamber which replaces the cooling tower. The lower portion of the chamber is a water basin from which the water is pumped to the overhead water sprays. Air is drawn in through the outside wall near the bottom of the chamber and discharged from a horizontal opening near the top of the chamber. The heat exchanger coils are placed in the chamber so that the water spray and air currents produce the cooling effect in a manner similar to an evaporative condenser as used in refrigeration practice. The engine jacket water is forced through the coils and back to the engine by means of three 5" x 4" Worthington Monobloc pumps running 1,730 rpm. The equipment mentioned constitutes a closed cooling system in which a full flow of jacket water may circulate at all times, but the temperature of the jacket water may be controlled by changing the quantity of air or spray water being circulated.

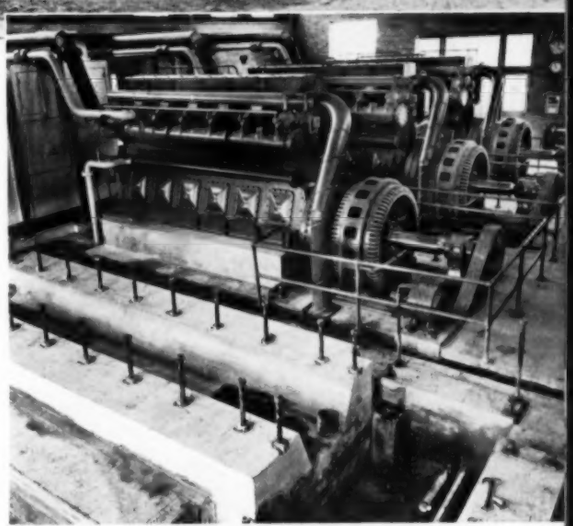
The cooling unit is located in the engine room and adjacent to the wall so that the air is drawn in from and discharged to the outside atmosphere. The air duct openings in the wall are hooded to eliminate dust and dirt, and

In this view of Vestaburg's modern power plant the outlets of the three Burgess exhaust Snubbers may be seen extending above the roof.

dampers are fitted in the openings to regulate the flow of air. Minneapolis-Honeywell Aquastats are installed in the cooling system and connected to the alarm panel to indicate low and high water pressure and high water temperature.

The cooling water for the system comes from a well directly beneath the water softening room. The water is raised by either of two 1½" D23, 3 hp. Worthington Monobloc pumps and is forced through a Permutit Zeolite Type of water softener and into a 998 gallon pressure type storage tank. A pressure control switch in the storage tank starts one of the pumps when the water pressure is reduced to a predetermined point and stops the pumps when the pressure is up to the high limit. The treated water flows due to the tank pressure to the basin under the Buffalo cooling unit where the proper level is maintained by a float valve.

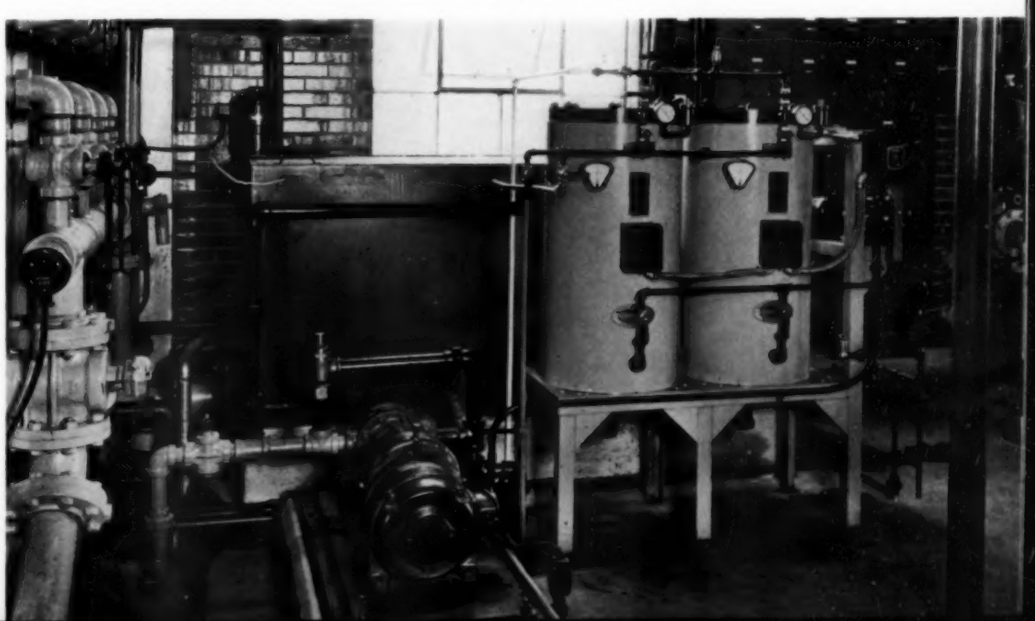
The compactness of the water supply and the cooling system is better appreciated when stated as follows: The well, two well pumps, the

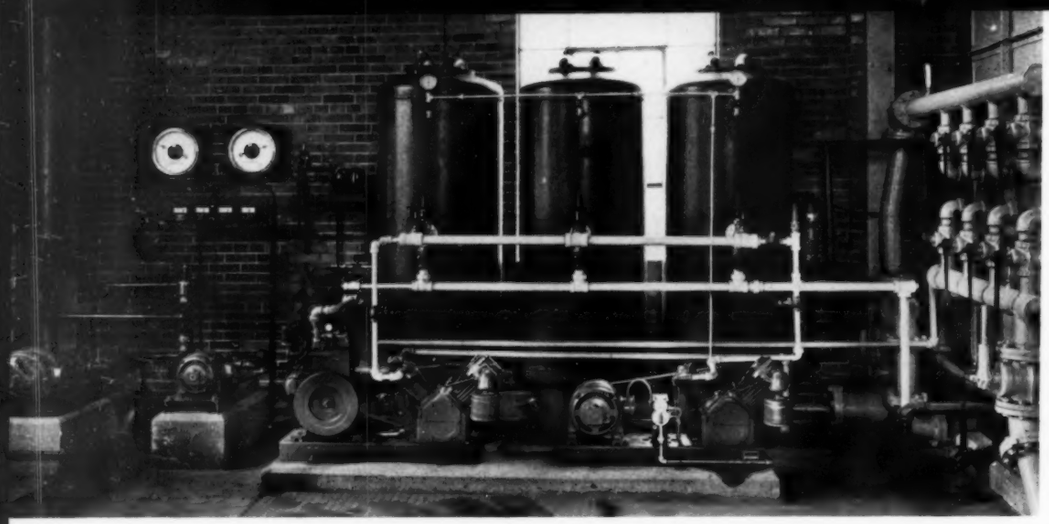


This general engine room view shows the base ready to receive the fourth and largest Worthington Diesel engine.

Zeolite softener, and the 998 gallon water storage tank are located in a room of 8' x 9' floor space; and the cooling unit which replaces the cooling tower and heat exchanger occupies a space about 8' x 10' x 9' high in the engine room. Thus, all of the cooling system for a 2,500 hp. plant is located inside of the plant and is conveniently arranged for care and servicing when the occasion demands.

View of the two Skinner lube oil purifiers and Westinghouse motor-driven Worthington lube oil transfer pump, with evaporative water cooler, and inlet and outlet headers showing at left.





Alternate motor and gas engine-driven two-stage Worthington air compressors and storage tanks which comprise the engine starting equipment. Note two fuel oil storage Master Levelometers and four day tank Midget Levelometers.

The air is drawn in on the east side of the building through 10″ Burgess Air Filter and Silencer Units and piped underneath the floor. The air intake pipe for each engine turns up from the floor, adjacent each engine, to join the air intake manifold. The exhaust is conducted from the engine manifold horizontally through the west wall of the building and is then carried up outside the building through Burgess Snubber type silencers. The air inlet and engine exhaust systems are short, simple, and neatly arranged with adequate equipment to muffle both inlet and exhaust noises. Alnor pyrometers are mounted on each engine with thermocouples located in the exhaust fitting of each cylinder.

Shell Talpa lubricating oil of an S.A.E. 30 grade is used in all engines for cylinder and crankcase lubrication. The crankcases of the engines are piped so that the oil may be removed for periodic filtering and cleaning. The oil is cleaned and filtered in two Skinner type PPE-19 Lube Oil Purifiers. The transfer of the oil is effected by a Worthington 1½″ type GR Rotary Pump driven by a 1½ hp. Westinghouse Motor through a gear reducer. Each engine is equipped with a 12-feed Manzel Model 94D force feed lubricator for cylinder lubrication.

The starting air equipment consists of one Worthington Model VA2HE6 2 stage, air cooled, compressor driven by V-belts from a Novo Type KU 3 x 4 Gasoline engine, one Worthington Model VA2HM 2 stage, air cooled, compressor V-belted to a 3 hp., 1,750 rpm. Westinghouse electric motor, and three 30″ x 72″ air storage tanks of welded construction and rated for 250# W.P. Each tank is equipped with the customary pressure gauges and relief valves. The grouping of the air starting equipment is compact and neat, and its location is such as to facilitate servicing of any piece of the equipment.

The switchboard is quite modern and complete, and adequate provision has been made for any future addition or changes in the plant equipment and feeder circuits. The board consists of fourteen 28″ x 90″ dead front steel panels arranged as follows: One Synchronizing Panel, three Engine Panels for Present Engines, three Blank Panels for Future Engines, one Voltage Regulator Panel, one Alarm and Station Panel, one Main Metering Panel, two Feeder Panels for Present Circuits, and two Blank Panels for Future Circuits.

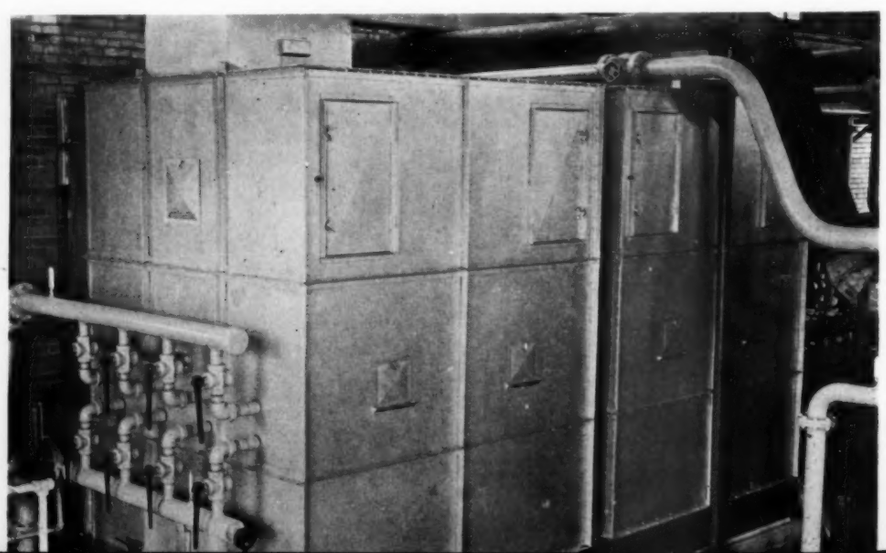
The upper half of the synchronizing panel is hinged so that it may be turned to face any engine but may be pushed back flush with the remainder of the switchboard when not in use. It contains two 0-3,000 volt AC voltmeters, one for the bus voltage and one for the oncoming unit, a 55-65 cycle frequency meter, a 0-150 volt DC voltmeter for the exciter voltage, and an Allis-Chalmers Synchro-Operator.

Each engine panel includes an AC ammeter, a kilowatt meter, the governor control, and synchronizing switches, and a Sangamo Type HCS watthour meter of the 3 wire-3 phase type and 2 Westinghouse Overcurrent Relays. The voltage regulator panel includes 3 Allis-Chalmers Type AA-2 Rocking Contact (Brown-Boveri Design) voltage regulators. Additional regulators will be added as new engines are installed. The station and alarm panel includes the push button starting switches for all station auxiliaries, alarm growler, and signal lights for the lubricating oil and cooling water circuits, and meters for measuring all power used by the station. The main metering panel is equipped with Esterline-Angus recording voltmeter and recording wattmeter as well as the usual integrating type of kwh. meter.

The board was built by the Ideal Electric and Manufacturing Company, and was installed by the Lewis Electric Company, who were the general contractors for the entire station. The station design and general engineering was handled by the Southern Michigan Engineering Corporation of Bellaire, Michigan. The Vestaburg plant is under the general supervision of Mr. Dolph H. Wolf, Manager of the Tri-County Electric Co-Operative with headquarters at Portland, Michigan, and is in direct charge of Mr. Don Cady, chief engineer of the Vestaburg plant. This project was financed by the Rural Electrification Administration and planned and constructed under the supervision of the engineering staff of R.E.A. It is one of approximately twenty-five central generating plants R.E.A. has financed.

The load on the plant is growing daily as new customers are connected to the system. Peak loads of 750 kilowatts have been recorded, and it is anticipated that the peak loads this winter may exceed 1,000 kilowatts. The size of the units selected fits the load curve nicely and, as a result of good load factors and careful operation, the plant is averaging 12½ kwh. per gallon of fuel.

View of the double Buffalo Forge evaporative cooling unit. The operation of this unit is described in detail in this article.



The above illustrates how General Motors 2-cycle Diesel engines, which power and light the huge Ringling Brothers-Barnum & Bailey Circus, are mounted on trucks and moved to the circus lot.

DIESELS FOR TENT SHOWS

By GEORGE D. CROSSLEY

WITH weight and bulk important considerations in the choice of their equipment, tent shows in increasing numbers are turning to Diesels for their power requirements. Outstanding among the installations made this season are those for The Ringling Brothers and Barnum & Bailey Combined Shows and the Hennies Brothers Shows. Both shows now have General Motors Diesel generator sets mounted on wagons for use on the lot, as well as smaller rail units.

Ringling-Barnum has six engines of the small, or 71, series, five of them being 6-cylinder, 90 hp. models. Driving direct-connected generators, these furnish all the current required by the huge show from the time it is set up until it is torn down, including lighting and the operation of the air-conditioning equipment for the main top. The sixth is a 3-cylinder, 45 hp. unit that supplies light and power for the circus train. Similar "packaged power" units are being employed by the Hennies Brothers' Shows. Nine 6-cylinder models are used by the carnival on the lot and a 1-cylinder, 15 hp., 10 kw. generator set for the train.

Three more of the 6-cylinder units are required by Hennies Brothers than the circus, since the carnival uses them to power and light its Ferris wheels and other rides, in addition to providing illumination for the midway. The show carries six towers, each mounting ten 1,000 watt bulbs for brilliant lighting.

In view of the fact that the Diesels in use by the Shows are mounted in open-sided trucks within view of the public, the power plants have been "dressed up" to a certain extent. The Ringling-Barnum engines are painted a pearl gray, and have chromium-plated radiator grilles, air cleaners, air cleaner housings, generator covers and instrument panels. Those purchased by Hennies Brothers are pearl gray, save for the bases, which are black. The radiator grilles likewise are finished in black, with the exception of the vertical bars, which are chromium plated.

Off for Central American fishing banks, the "Yankee" is especially equipped for the job she has to do.

DIESEL TUNA CLIPPER

By A. W. PONSFORD

YANKEE, newest tuna clipper to join the Southern California fleet, is an outstanding vessel from the design of her hull, by Marine Architect Adolph Larson, to her ultra-modern refrigeration system, and the application of Superior Diesel engines to the solving of her complicated engineering problems.

Built for Capt. Eddie Silva in the yards of Al Larson Boat Works, Terminal Island, Calif., the *Yankee* is of wooden construction. Her length is 115 ft. over-all; beam, 26½ ft.; depth, 14½ ft. Maximum forward draft is 10½ ft.; aft, 16½ ft., with minimum freeboard of 8 in. Her frames, of Douglas fir, are sawn: 10 in. heel, 6 in. head, spaced on 20 in. centers giving tremendous strength. Deck thickness is 2¾ in., planking same, with 5 in. double frames. Trim is mahogany.

Modern standard lines of hull construction are followed, attention being centered on stability. The lines ride cleanly back from a semi-clipper bow to the squat, fantail stern. The secondary deck carries completely aft to the bait tank structures, permitting all accommodations, including the customary chapel found on all Portuguese-owned clippers. Amidships are carried the 20 ft. powered net dory and the net skiffs, for bait seining.

The driving unit is a 490-550 hp., 8 cylinder Superior Diesel, 12½ in. bore, 15 in. stroke,

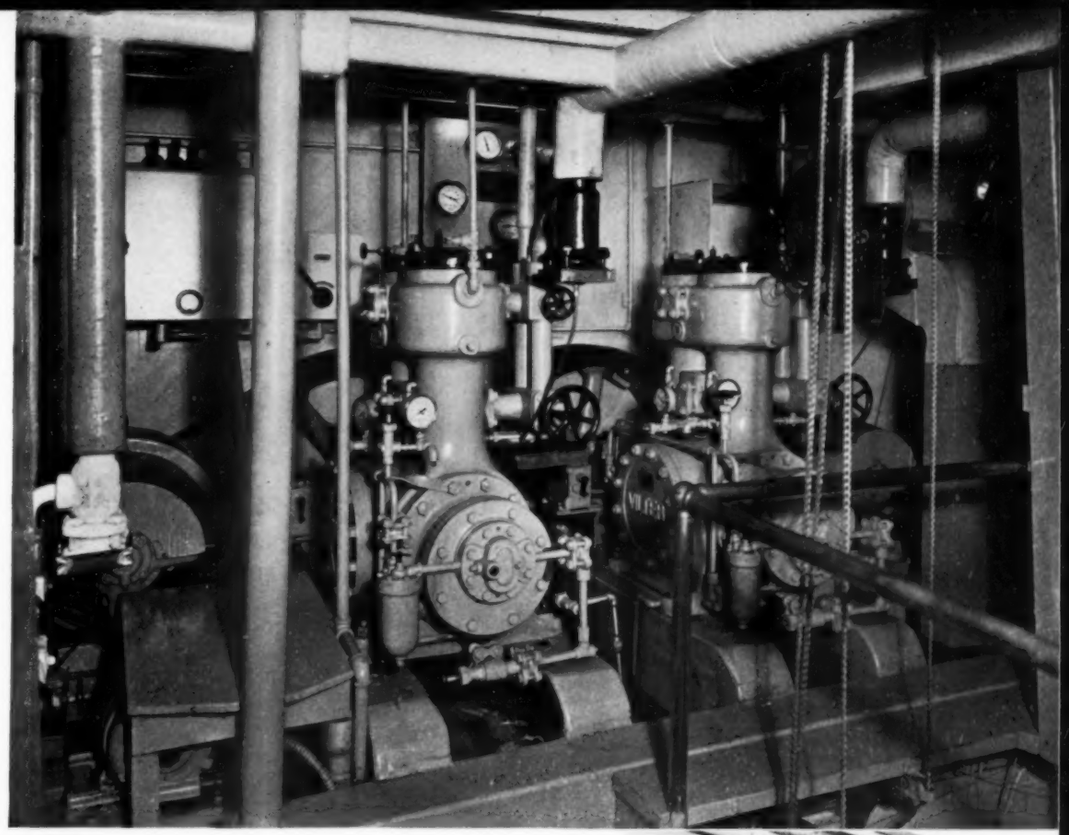
turning 350-400 rpm. This engine is direct-reversing, and can drive the clipper at approximately 11 knots. The heart of this clipper is her auxiliary Diesel-electric plant, for operation of bait pumps, the complicated refrigeration pumping system, etc. There are two Superior engines, each 130 hp., 3 cylinder, 9x12, turning 600 rpm. These are direct-connected to 100 kw. generators of 125 volts.

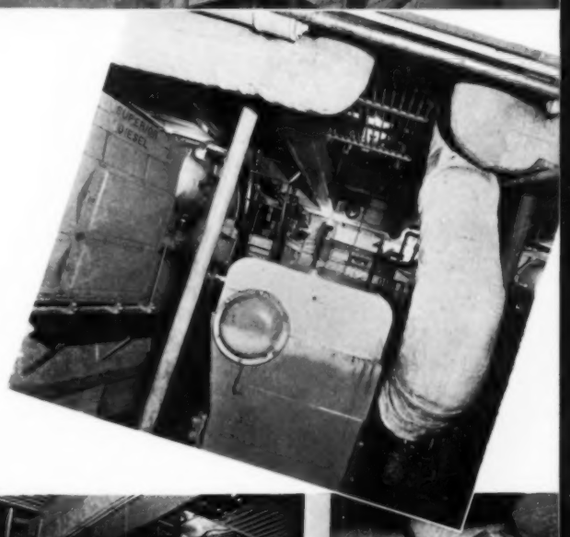
Pak-Ice refrigeration, developed and installed by Gay Engineering Corp., Los Angeles, was chosen to preserve in tropical waters the gross fare of 190 tons. This system employs what is commonly known as "slush ice," in which ice crystals are passed continuously into the brine stream. There are four Vilter ammonia compressors, which are set on the main deck immediately above the engine room. The main compressors are two $6\frac{1}{2} \times 6\frac{1}{2}$ vertical, single acting machines, driven by 30 hp. Fairbanks-Morse motors. The third is a $9\frac{1}{2} \times 7\frac{1}{2}$ booster and the fourth a $2\frac{1}{2} \times 2\frac{1}{2}$ machine, the latter for utility work. The three large machines operate in conjunction with two ice-crystal making machines, which both chill sea water and lower the temperature of brine used in sharp-freezing tuna in a series of wells and tanks.

Dense brine is circulated by two 5 in. Fairbanks-Morse pumps, driven by $7\frac{1}{2}$ hp. motors. The pumping system is at once individual to the various storage compartments and interchangeable with the whole.

In brief, the system calls for the building up of reserve refrigeration in wells which become filled with slush-ice saturated brine water. when a well is filled with fish, the equipment quickly removes body heat and reduces temperature to around 28 degrees F. This brine is later pumped overboard and slush-ice substituted.

This dense brine circulates rapidly through the chilled fish, practically sharp-freezing the carcasses. Very low temperatures are permitted by the system, but are not desirable. In from 8 to 12 hours the fare is frozen. Then the density of brine is allowed to build up and the fish held in this mixture of heavy brine and slush-ice. Each well is given periodical circulation to insure even distribution of temperature. On a modern tuna clipper, which carries no chipped ice for individually wrapping the fish carcasses, the wells and tanks do double duty. Some act first as auxiliary bunkers; the rest as bait receivers. To keep alive a vast quantity of lures, two 12 in, suction, 10 in. discharge, vertical type pumps continually





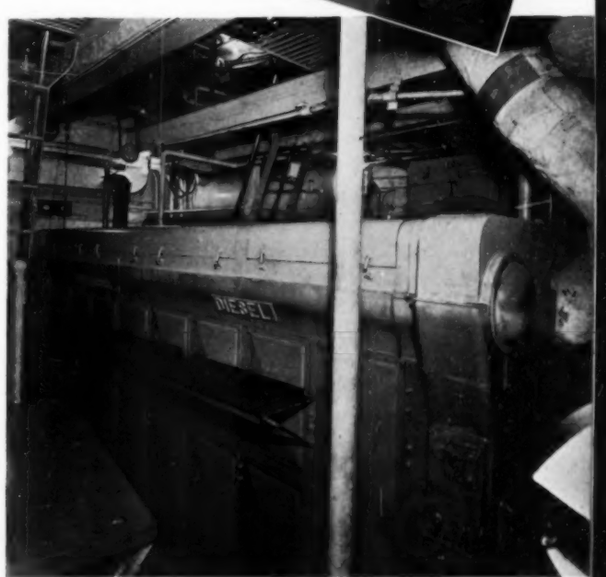
Above — Two of the four Vilter main compressors which operate Pak-Ice refrigeration system. Right — One of the two Superior auxiliary Diesels. Below — View of the 550 hp. Superior Diesel main propulsion engine.

circulate ocean water through the receivers. These are operated by 30 hp. motors. The main bait tanks are aft on the main deck, two in number with an over-all of 29 ft. by 17 ft. by 6 ft.

To guard against long expensive towing due to breakage, the *Yankee* is equipped, like most modern-built tuna clippers, with a tail shaft of Monel, manufactured by the International Nickel Co. This shaft, 6 in. in diameter, corrosive resisting in tropical water where the clipper will mostly operate, turns a 70 in. 3 blade Lambie wheel.

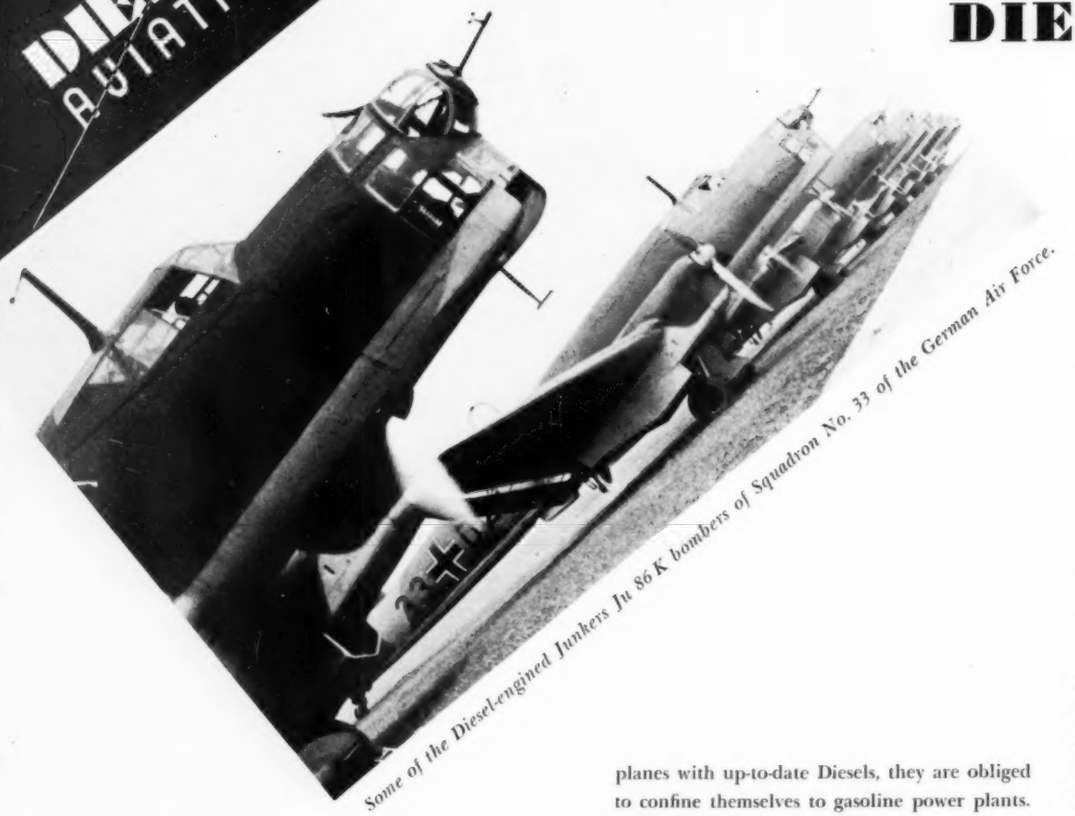
One of the ship's essential navigational aids is a Fathometer, these sonic depth finders having been found indispensable in the poorly charted area at Central American banks. She carries a commercial wireless set of globe-circling range; also the newest adjunct, a radiotelephone.

Her bunkers approximate 19,000 gals. of Diesel fuel; she carries nearly 1,000 gals. of lube oil and 2,000 gals. of fresh water. The cruising radius is estimated at 6,000 miles without refueling. She is manned by a crew of sitxeen men, including the navigator, wireless operator and cook.



DIESEL AVIATION

DIESEL-ENGINE WA



Some of the Diesel-engined Junkers Ju 86 K bombers of Squadron No. 33 of the German Air Force.

By PAUL H. WILKINSON

ALTHOUGH thousands of Diesel aircraft engines have been produced and are still being produced in Germany, it is noticeable that "wishful thinkers" in the Air Ministries of Great Britain and France are still of the opinion that the gasoline engine is the only type which is suitable for military aircraft. Nearly two years ago, the Cadman Committee in England recommended that the Diesel should be developed there for aviation. This sound advice was neglected, however, and now the British do not have an up-to-date Diesel aircraft engine. Nor has France profited greatly from the expenditure of vast sums of money on Diesel research. None of the French Diesel aircraft engines are sufficiently advanced for mass production and to all intentional purposes, they are merely experimental.

Both Great Britain and France had ample warning had they heeded it, in the appearance of the German Junkers Jumo 205 Diesel aircraft engine in 1933. Both nations were interested to the extent of buying sample engines from Germany but they failed to develop satisfactory Diesels of their own. Now, when Great Britain and France should be equipping their warplanes with up-to-date Diesels, they are obliged to confine themselves to gasoline power plants. When the Junkers Jumo 205 was placed in production in 1935, it developed only 550 hp. In the years which followed, difficulties relative to cylinder cooling, piston ring leakage and inefficient scavenging were overcome and corresponding increases in engine performance were obtained. Today, thousands of these Diesels have been built and are giving satisfactory performance. The Jumo 205-E is now rated at 750 hp. for take-off and a still later model, the Jumo 205-D, develops 880 hp. These engines are equipped with a ground blower for scavenging and are not intended for very high altitude operation.

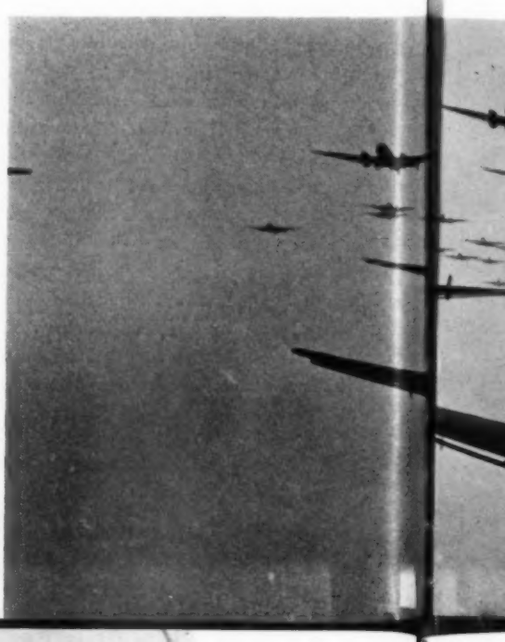
Vast numbers of these Jumo 205 Diesels have been installed on Junkers Ju 86 K twin-engined bombers, as is shown by the accompanying photographs. New patrol flying boats for the German Air Force such as the three-engined Blohm & Voss BV 138, the three-engined Dornier Do 24 and the military version of the four-engined Dornier Do 26, are equipped with these power plants. They are also used on fast four-engined torpedo planes developed from the Blohm & Voss Ha 139-B twin-float mail plane of transatlantic fame.

In 1936, the Jumo 205 appeared with a turbo-supercharger which clearly indicated the trend of future development. Due to the relatively low temperature of the exhaust gases of the Diesel, no difficulty was encountered with the turbine and much better supercharging was obtained than with a gear-driven compressor. Now the Jumo 207, of the same displacement as the Jumo 205, is equipped with a turbo-supercharger which boosts its output to 1,000 hp. for take-off and maintains this power output to an altitude of more than 20,000 ft.

As has been mentioned before, Great Britain has neglected to develop modern Diesel aircraft engines and has concentrated on gasoline engines on the assumption that the latter give far better performance. If the two leading multi-bank, in-line British engines – the Napier Dagger VIII and the Rolls-Royce Merlin X – are compared with the Junkers Jumo 207 Diesel, however, a different picture is presented.

From the accompanying tabulation, it is seen that the weight of the Diesel compares very favorably with that of the two gasoline engines. It is also seen that while the maximum power output of the three engines is approximately the same, the Diesel has a higher rated altitude and a greater specific power output per unit of displacement. The take-off rating for the three engines is 1,000 hp., 955 hp. and 1,075 hp., respectively, while their specific fuel consumptions are 0.34 lb., 0.46 lb. and 0.50 lb. per hp. per hour when cruising at 66 per cent power output. These figures show that the high-performance Diesel aircraft engine as exemplified by the Junkers Jumo 207, is equal in performance to the best multi-bank, in-line gasoline engines which Great Britain has to offer.

In addition to parity with the gasoline aircraft



NEW WARPLANES IN EUROPE

engine, the Diesel has the inherent advantage of freedom from electrical interference. If a ray machine capable of garbling the electrical ignition circuits of British gasoline-engined warplanes were carried by a German sub-stratosphere plane, the latter could readily protect its brood of Diesel-engined bombers from hostile aircraft. Likewise, munition factories and industrial centers in Germany could be protected against air raids by hostile gasoline-engined bombers. It may be contended that such a ray machine is fantastic and impracticable. The same thing was said about the Diesel aircraft engine itself 30 years ago.

The high-altitude Jumo 207 turbo-supercharged Diesel can be used on various type of warplanes. As its frontal area is quite small, it is suitable for fast twin-engined bombers and escort fighters for long-range missions as well as for high-altitude fighters. In addition to this highly efficient power plant, Germany also has the 1,200 hp. Jumo 206 Diesel which can be turbo-supercharged to deliver 1,500 hp. for take-off. These slightly larger and far more powerful Diesels are used on large four-engined bombers such as the Junkers Ju 89 which has been developed from the Junkers Ju 90 airliner.

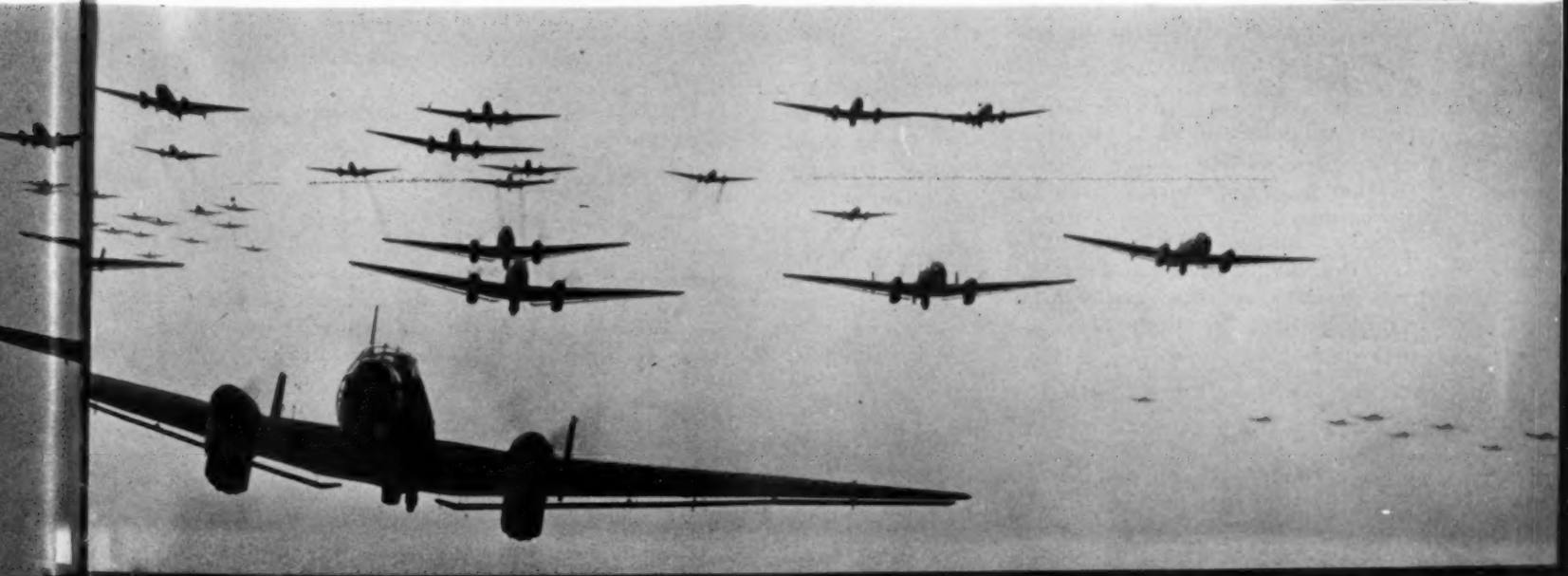
What have Great Britain and France in the way of power plants to compete with these up-to-date and highly efficient German Diesel aircraft engines? Nothing but gasoline engines with lower specific power outputs and higher fuel consumptions, together with vulnerable electrical ignition systems. Such is the folly of neglecting Diesel development – a practice which has also been studiously followed by the government of the United States.

COMPARISON BETWEEN MODERN EUROPEAN DIESEL AND GASOLINE AIRCRAFT ENGINES

Make and model	*Junkers Jumo 207*	*Napier Dagger VIII*	*Rolls-Royce Merlin X*
Total displacement	1,014 cu. in.	1,027 cu. in.	1,647 cu. in.
Maximum power	1,000 hp.	1,000 hp.	1,010 hp.
Rated altitude	20,000 ft.	8,750 ft.	17,750 ft.
Output per 100 cu. in.	98.6 hp.	97.3 ft.	61.2 hp.
Weight of engine	1,430 lb.	1,390 lb.	1,394 lb.
Specific weight	1.43 lb./hp.	1.39 lb./hp.	1.38 lb./hp.
Fuel consumption	0.34 lb./hp./hr.	0.46 lb./hp./hr.	0.50 lb./hp./hr.

Close-up of three Junkers Ju 86 K bombers showing the neat installation of their Junkers Jumo 205 Diesels. No other nations have Diesel-engined warplanes.

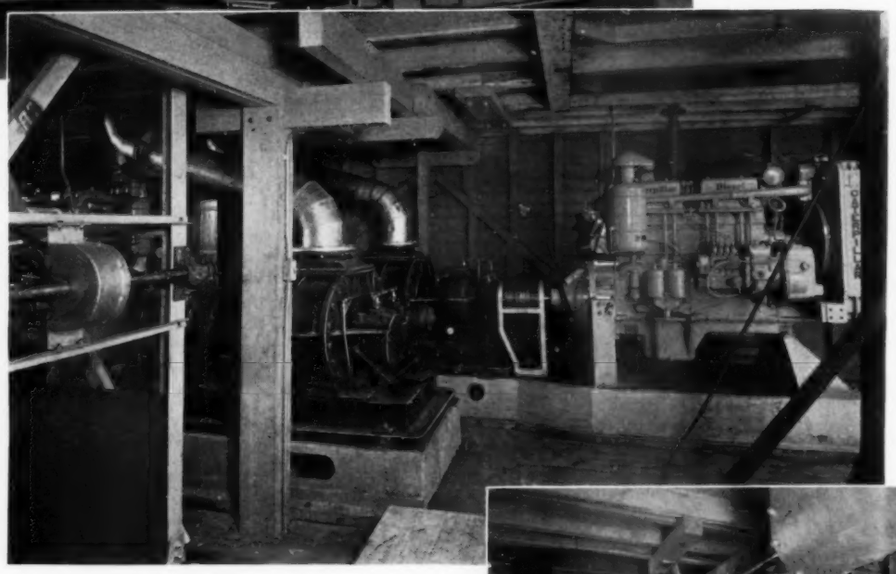
Below – An impressive view of some of the Diesel-engined bombing squadrons of the German Air Force.



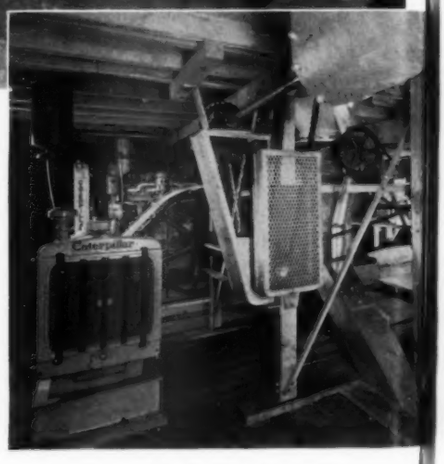
Exterior view of grain "Barge E-1" showing the grain handling superstructure at the left.

DIESELS HANDLE BULK GRAIN

By P. F. WOOD



View showing Diesel Driven Rotary Blowers supplying air to the airveyors.



General view of drive arrangements for handling grain mechanically.

PRESAGING a material change in the method of handling grain in this region, the Erickson Navigation Co. *Barge E-1* returned recently from her first trip since the installation of equipment for loading bulk cargo. For years it has been the established custom to ship all grain in sacks, thereby increasing the cost and retarding the handling. In making the change to the new method President A. T. Gibson of the Erickson Navigation Co. decided not only to gain the advantage of moving the grain by mechanical devices but to get the additional efficiency that only Diesel engines could effect. To that end there are three Caterpillar Diesels in the installation aggregating 200 hp.

For many years past *Barge E-1* has been a familiar sight on San Francisco Bay and the San Joaquin and Sacramento Rivers, picking up grain at the river landings and delivering to various shipping terminals or grain warehouses. The work had always been done with a ten man crew, using the ordinary hand trucks. It was generally a days work to load or unload. The barge, 100 ft. long by 30 ft. beam, had a capacity of 250 tons.

The new equipment for handling the cargo in bulk was designed and built by the Fuller Co. of Catasauqua, Penn. It consists of both pneumatic and mechanical methods, all driven by the Caterpillar Diesel engines. There are two units of 80 hp., each direct-connected through a Twin Disc clutch to a 10 inch Airveyor which furnish the suction power to load the barge. The other engine is 40 hp. and also fitted with a Twin Disc clutch to an Allis-Chalmers Texrope Drive for operating the elevator belts, auger conveyors, and accessories. All engines are four cylinder models and fitted with Donaldson Air Cleaners and Pur-O-Lator filters. The transmission gear and 14 inch augers are Link Belt products.

All the work of installation was performed in the Colberg Shipyard at Stockton under the supervision of Henry Colberg. The machinery is all located well forward and full cargo capacity has been maintained. The deck is divided into ten bins to correspond to rail car lot shipments, two bins being equal to one carload.

In describing the operation of the new equipment Capt. A. T. Silva reported that they averaged a ton a minute and that four men were sufficient to perform all the work. Chief Engineer V. J. Silva stated that the engine performance was highly satisfactory and that the gauge reading on the Airveyors was between 5 and 6.

It is worthy of mention that *Barge E-1* is towed by the tug *Matsu*, powered with a 75 hp. Atlas Diesel engine. This towboat has a long record of satisfactory service and makes an excellent showing in spite of the very modest power plant for handling so large a barge.

SEABOARD TO OPERATE THREE DIESEL TRAINS TO FLORIDA

NEW YORK, N. Y., Oct. 25th.— Three great air-conditioned limiteds to Florida providing daily service are to be placed in operation this December by the Seaboard Railway, it was announced today by the line's passenger department. The Seaboard will be the only railroad to Florida operating three different Diesel-electric powered daily trains to the Sunshine State.

Last year the Seaboard pioneered by offering the first streamliner in the north-south service, its successful "Silver Meteor," that streamlined silver streak which presented the most modern note in Florida de luxe coach travel. Demands for space on this stainless steel train have been consistently so great that the Seaboard ordered two more complete trains constructed, they also to be powered by 2,000 hp. Diesel electric locomotives.

Starting about December 1st, the three "Silver Meteors" will provide daily all electric service to Florida points, one hour and a half faster than last year. The "Meteors" and other Seaboard trains use Pennsylvania Railroad tracks between New York and Washington and those of the Richmond, Fredericksburg and Potomac from the nation's capital to Richmond.

In addition to the daily Meteors, the West Coast Orange Blossom Special, a sleeping car and coach train, the crack train to the Florida West Coast, will be powered for the first time this year by Diesel electric locomotives. This fast train serves Savannah, Sea Island, Jacksonville, and Florida west coast cities. Buffet lounge service is to be added to this train and its other accommodations are on the same high plane as those of the East Coast Orange Blossom Special. It is equipped with tightlock couplers, rubber draft gear and other anti-noise devices, being a twin of the Seaboard's premier sleeping car limited, the East Coast Blossom. Sleeping cars on the West Coast Blossom are newly decorated.

The Orange Blossom Specials start operation from New York, December 15th, the West Coast running one hour and a half faster than last year to St. Petersburg and Tampa. The East Coast also is to operate on a fast schedule, making the New York-Miami run in 26 hours and fifteen minutes.

All of these Diesel trains are powered with Diesel-electric locomotives designed and built by the Electro-Motive Corp. of La Grange, Illinois.

Latest Diesel Patents

A description of the outstanding patented inventions on Diesel and Diesel accessories as they are granted by the United States Patent Office. This information will be found a handy reference for inventors, engineers, designers and production men in establishing the dates of record, as well as describing the important Diesel inventions.

Conducted by C. CALVERT HINES*

2,165,791

DRIVING MEANS FOR INTERNAL COMBUSTION ENGINES

Michael J. Farrell, Atlantic Highlands, N. J., assignor of one-fourth to Francis J. McKeever, Jersey City, N. J.

Application July 16, 1937, Serial No. 153,891

1 Claim. (Cl. 74 – 44)

In driving means for internal combustion engines, a cylinder, a piston mounted for reciprocation in the cylinder, a crank shaft having a crank pin, a connecting rod carrying the piston through said crank pin, rollers carried at opposed faces of the piston rod and pivotally held thereon against bodily movement, cam members carried by the crank and movable therewith and in contact with said rollers, and an elongated bearing aperture formed in the base section of the piston rod and embracing the crank pin.

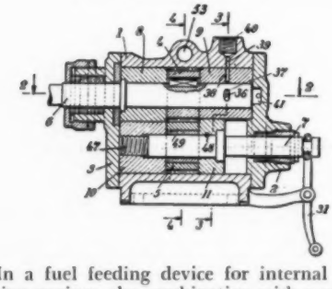
2,157,285

FUEL FEEDING DEVICE FOR INTERNAL COMBUSTION ENGINES

Fritz Egersdorfer, Berlin, Germany

Original application September 4, 1937, Serial No. 162,430. Divided and this application May 18, 1938, Serial No. 208,618. In Germany September 26, 1932

1 Claim. (Cl. 103–2)



1. In a fuel feeding device for internal combustion engines, the combination with a casing, a pair of interengaging gear wheels within said

*Patent Attorney, 811 E Street, N.W., Washington, D.C.

casing, said casing being provided at opposite sides of the line of engagement of said gear wheels with suction and pressure chambers and being also provided with delivery passages, driving means for said gear wheels comprising a shaft on which one of said gear wheels is mounted and which is rotatable therewith, and a bushing fitted in said casing and providing a bearing for said shaft, said shaft being substantially equal in diameter at the part carrying the said gear wheel and at the part mounted in said bushing, the part of said shaft mounted in said bushing and the bushing providing a bearing therefor being provided with cooperating distributing passages communicating respectively with said pressure chamber and with said delivery passages.

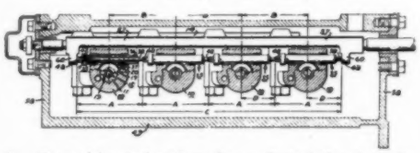
2,159,360

FUEL INJECTION MECHANISM

Oscar L. Starr, Mission San Jose, and George W. Lewis, San Leandro, Calif., assignors to Caterpillar Tractor Co., San Leandro, Calif., a corporation of California

Application May 19, 1936, Serial No. 80,566

7 Claims. (Cl. 103—41)



1. Control mechanism for a fuel injection device adapted to be detachably mounted on an engine with other similar detachably mounted devices and of the type having members relatively adjustable to control fuel injection, comprising an element having an axially extending passage therethrough, and means extending through said passage beyond both of the opposite ends of said element and having a threaded connection with said element to effect relative axial adjustment with respect thereto, said means being of a predetermined length and having its ends formed for freely disengageable surface contact with corresponding means of similar devices.

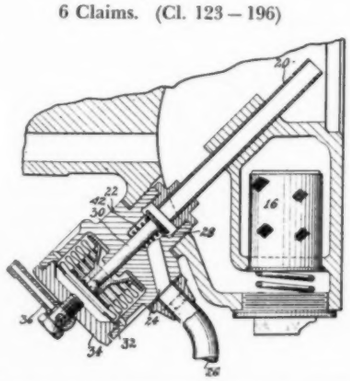
2,162,259

ENGINE OIL SCAVENGING DEVICE

William D. Kennedy, West Englewood, N. J., assignor to Wright Aeronautical Corporation, a corporation of New York

Application February 10, 1938, Serial No. 189,770

6 Claims. (Cl. 123—196)



1. In an engine in combination, a crankcase subject to oil accumulation when the engine is not operating, an overflow drain member in said crankcase having an opening for relieving such accumulation, an induction duct subject to low pressure in engine operation, and means responsive to low duct pressure for closing said drain opening.

2,163,458

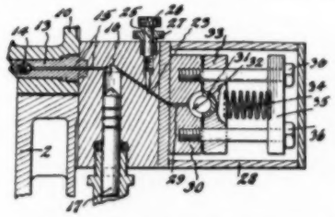
FUEL FEEDING AND DISTRIBUTING MECHANISM FOR INTERNAL COMBUSTION ENGINES

Wallace Clark, Indianapolis, Ind.

Application December 28, 1936, Serial No. 117,939

13 Claims. (Cl. 123—139)

1. In an internal combustion engine of the class described including a plurality of working cylinders, individual high pressure solid fuel injection means for each cylinder, a single low pressure rotary distributing, metering and supply means for supplying metered quantities of fuel at a low pressure to said high pressure injection means, and individual fuel regulating means for each cylinder intermediate the low pressure distributing, metering and supply means and the high pressure injection means



for individually regulating the quantity of fuel delivered by said distributing, metering and supply means to said individual high pressure injection means.

2,161,743

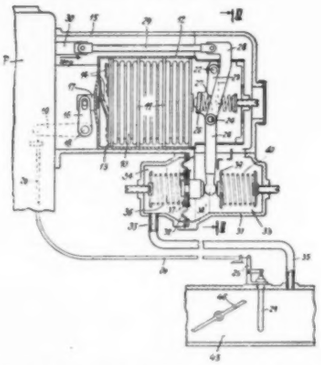
CONTROL MEANS FOR THE FUEL SUPPLY OF INTERNAL COMBUSTION ENGINES

Hans Heinrich and Johann Friedrich Janssen, Stuttgart, and Kurt Fiedler, Stuttgart-Kaltental, Germany, assignors to Robert Bosch Gesellschaft mit beschrankter Haftung, Stuttgart, Germany

Application February 24, 1938, Serial No. 192,366

In Germany September 7, 1936

11 Claims. (Cl. 123 – 140)



1. Control means for the supply of fuel to internal combustion engines, comprising at least one membrane box containing a gaseous medium and sensitive to temperature and pressure variations, means for feeding fuel to the engine, means for operably connecting said membrane box with said feeding means, and temperature sensitive means operating in opposition to said membrane box for at least partly nullifying that portion of the effect of said membrane box on the feeding means due to temperature changes.

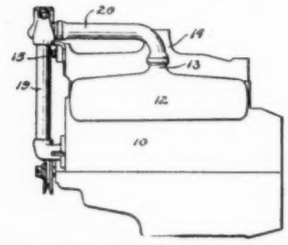
2,161,942

COOLING SYSTEM FOR INTERNAL COMBUSTION ENGINES

Emil Zoerlein, Dearborn, Mich., assignor to Ford Motor Company, Dearborn, Mich., a corporation of Delaware

Application January 13, 1938, Serial No. 184,784

7 Claims. (Cl. 123 – 178)



1. An internal-combustion engine having a water jacket around its combustion chambers, said water jacket having inlet and outlet openings therein, comprising a conduit extending from said outlet to said inlet opening so that cooling water may circulate through said jacket and conduit, said jacket and conduit forming a cooling sytsem, an injector nozzle disposed within said conduit, means for injecting relatively cold water through said nozzle to produce an injection action which both cools and circulates all of the fluid in said cooling system, and means for discharging heated water from said water jacket in an amount equal to the cold water introduced through said nozzle, said heated water being discharged from the cooling system at a point between said outlet opening and said nozzle.

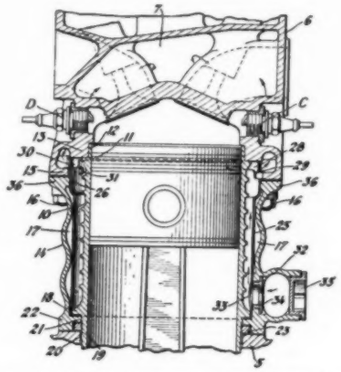
2,162,082

LIQUID COOLING MEANS FOR INTERNAL COMBUSTION ENGINES

Ronald M. Hazen, Indianapolis, Ind., assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Application October 7, 1937, Serial No. 167,697

6 Claims. (Cl. 123 — 173)



5. In liquid cooling means for internal combustion engines and in combination with a plurality of cylinders, a jacket enclosing all of said cylinders and spaced therefrom to provide a chamber within said jacket, and a hollow head having valve controlled ports; tubular sleeves surrounding said cylinders and arranged within said chamber and through which cooling liquid flows into said head, and the upper ends of which sleeves have outlets arranged so as to direct streams of cooling liquid toward said ports; a cooling liquid supply manifold extending along the lower end of said jacket and from which cooling liquid flows into the lower ends of said sleeves; and metering plugs included in the passage between said manifold and said sleeves for regulating the flow of cooling liquid into said sleeves.

2,163,313

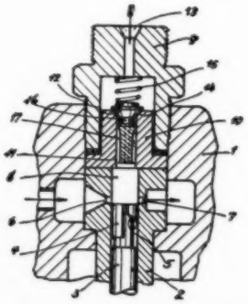
FUEL INJECTION PUMP

Willy Voit, Stuttgart-Bad Cannstatt, Germany, assignor to Robert Bosch Gesellschaft mit beschrankter Haftung

Application October 9, 1936, Serial No. 104,874

In Germany October 17, 1935

6 Claims. (Cl. 103 — 41)



1. A fuel injection pump for supplying fuel to engines, comprising a cylinder, a reciprocable piston mounted therein, a discharge valve, a pressure conduit behind said valve, means for releasing an adjustable amount of the fuel displaced by said piston at its pressure stroke, and a guide seating for said discharge valve, said valve and guide seating having cooperating controlling surfaces to provide a passage in said guide seating for flow of fuel from said cylinder to said pressure conduit and a closure for said passage, a portion of said passage be-

ing of unchanging cross-sectional area and a portion being of gradually increasing cross-sectional area whereby, on the opening stroke of said valve, for a considerable initial part of the total opening stroke said valve opens a throttling passage of very small but unchanging cross-sectional area for flow of fuel and then for a further and also large part of its opening stroke said valve opens a passage for flow of fuel which gradually increases in cross-sectional area until the maximum cross-sectional area is reached.

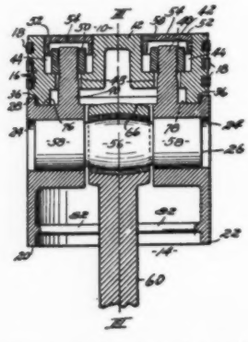
2,163,803

PISTON AND CONNECTING ROD CONSTRUCTION

John Pearl Orris, Kansas City, Mo.

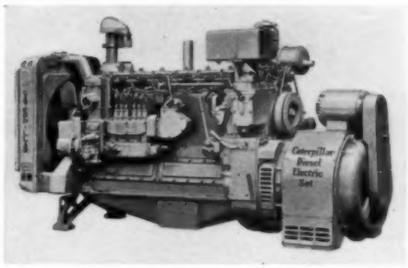
Application June 15, 1936, Serial No. 85,337

3 Claims. (Cl. 309 – 15)



1. A piston comprising a head member having piston ring grooves in the outer wall thereof and having holes formed through the top wall; a two-piece skirt having transverse bearings adapted to receive a wrist pin; a stud carried by each of said skirt members extending though the holes formed through the top wall of said head member and adapted to have transverse adjustment therein; adjustable members associated with said studs whereby said head and skirt members are secured together; and segmental, spaced-apart, substantially concentric walls carried by said head and skirt members; and shims positioned between adjacent walls whereby the head and skirt members are positioned in operative position, with openings therebetween to permit free flow of oil from the inside to the outside of said piston.

To answer a demand for a low cost, economical power plant of 30 kw. capacity, Caterpillar Tractor Co. of Peoria, Illinois, has added to its line of Diesel electric sets by announcing a model 46-30.



The new 30 kw. set includes a six-cylinder Diesel engine, and, as in the 15 and 20 kw. sizes, has all electrical equipment inbuilt, with the exception of a circuit breaker. Less than an hour is required to install the set and have it providing light and power.

Uses for the new 20 kw. set are widely varied. It is particularly well suited for hotels and theatres, and can be used to power air conditioning machinery in these and similar establishments. As a standby unit for airports, etc., it is also suitable. Like the smaller sets, it will fit into camps, carnivals, factories, ice plants, mines, quarries, and so forth.

The engine has but three operating adjustments, none of which involves the Diesel fuel system. The generator is of single unit construction, equipped with ball bearings. Built-in regulation enables the set to pick up large motor loads with little light flicker and voltage drop.

No rheostats, switchboards, instruments or complications of any sort are needed with the set. Because units of this capacity are almost always operated close to the power destination, even a voltage regulator is not necessary.

A NEW BOOK ON LUBRICATION

One of the most useful handbooks on Diesel lubrication to come across our desk in some time is "Modern Lubrication for Diesel Engines." In this book appear very interesting figures on general economics, history of the Diesel industry, horsepower production for the last ten years, classification of Diesel engines by types with diagrams vividly illustrating the difference in the types. An excellent book, well written, well illustrated, well printed! We urge our readers to write for a complimentary copy to Dr. L. W. Parsons, Tide Water Associated Oil Company, 17 Battery Place, New York City.

NEW SPACE SAVING SNUBBERS OFFERED BY BURGESS

AN addition to the present line of Burgess Snubbers, a new series known as the Burgess SDHC series Snubbers, is announced by the Acoustic Division of Burgess Battery Company.

The new line of Snubbers covers a range of standard pipe sizes from 1 to 32 inches. Both size and weight have been reduced by a unique rearrangement of the controlling parts. All of the performance features of the original Burgess Snubber are included in the new Burgess SDHC series Snubbers.

Another change in the new design lies in the substitution of concentric connections for eccentric connections to facilitate installation. Sizes 1 to 4 inches are provided with nipple connections, while sizes 5 inches and larger are provided with flange connections.

The addition of the smaller and lighter Burgess SDHC series Snubbers to the line of Burgess Snubbers introduced last year enables engineers to solve their silencing problems on difficult marine and crowded stationary installations.

B. ORCHARD LISLE, whose father, T. Orchard Lisle, is so well known to the Diesel industry, announces the establishment of his offices at 1472 Broadway, New York City, as consulting petroleum technologist and publicist.

BUDA APPOINTS NEW SALES MANAGER

MR. R. K. MANGAN, vice-president of the Buda Company of Harvey, Illinois, has announced the appointment of Mr. L. F. Shoemaker as sales manager of the automotive and industrial division of the company.

In 1920, Mr. Shoemaker joined the service department of the Buda Company going there from Service Motor Truck Company. In 1924, he was transferred to the sales department and has been, at various times, located in the New York, Cleveland, and Chicago territory.

NEW ASSOCIATION FORMED

THE Water Cooling Tower Association has recently been organized and Mr. L. T. Mart of the Marley Company elected president; Mr. W. J. Hoffmann of Lilie-Hoffmann Cooling Towers, Inc., vice-president, and Mr. W. J. Parker, 7 East 44th Street, secretary-treasurer. Mr. Parker's office will be the headquarters. Charter members are Binks Manufacturing Company. Foster Wheeler Corporation, The Fluor Corporation, Ltd., Lilie-Hoffmann Cooling Towers, Inc., The Marley Company, and Research Corporation.